East Englin. Library
JAN 12 1924

GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CLXIV. No. 3163.] LONDON, DECEMBER 26, 1923. [75TH YEAR. PRICE 1s.

OXIDE OF IRON
SPENT OXIDE

GAS PURIFICATION AND CHEMICAL CO., Ltd.
PALMERSTON HOUSE, LONDON, E.C.2.
Telegrams: "PURIFICATION, LONDON."
Telephone: 9144 LONDON WALL.

PUMPING ENGINES
All Types for ACID, &c.
CAST-IRON OR STEEL TANKS
Any Capacity.
CHEMICAL PLANT.
Roofs and Girders. Structural Work.
SULPHATE OF AMMONIA PLANT
Air and Gas Compressors.
MIXERS.
TAR STILLS AND CONDENSERS.
W. NEILL & SON, LD.
Engineers, Iron & Brass Founders,
ST. HELENS JUNCTION.
Telegrams: 'NEILL, ST. HELENS.' Telephone No. 20.

Berk will supply
Sulphuric Acid
made from Spent Oxide, for
Sulphate Making
Telephone Ave. 4032. Oak Berk Telegrams. Berk, London.
F.W. BERK & CO. LTD
1 FENCHURCH AVENUE, LONDON E.C.3
WORKS AT STRATFORD, E. & MORRISTON, GLAM.

"TORBAY PAINT"
FOR ALL PURPOSES.
The TORBAY PAINT CO.,
26/28, Billiter St., LONDON, E.C.
51, Old Hall St., LIVERPOOL.

"BLUEBELL"
SILICA RETORTS
(95% SILICA)
John G. Stein & Co., Ltd.,
Castlecary, SCOTLAND.

Telephones: 2966 VICTORIA. 2967 Do.
Telegrams: "GASIFICATION, Sowest, LONDON."
WALTER MOORE & SONS,
GAS COAL & COKE CONTRACTORS,
72, VICTORIA STREET,
LONDON, S.W. 1.

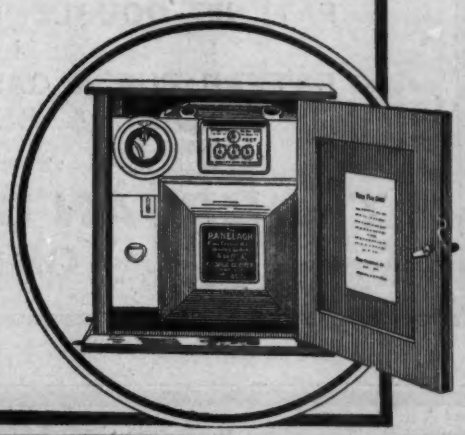
W. & B. COWAN
(Incorporated in Parkinson and W. & B. Cowan, Ltd.),
LONDON. MANCHESTER. EDINBURGH. GLASGOW.
SYDNEY. MELBOURNE. BRISBANE. WELLINGTON, N.Z.
(See Advertisement on p. III. of Wrapper.)

JAMES McKELVIE & CO.
Coal Owners,
Gas and Steam Coal Contractors,
17, RUTLAND SQUARE, EDINBURGH.
59, MARK LANE, LONDON, E.C.
GUILDHALL CHAMBERS, SANDHILL, NEWCASTLE-ON-TYNE.
24, CHAPEL STREET, LIVERPOOL.
ESTABLISHED 1840.

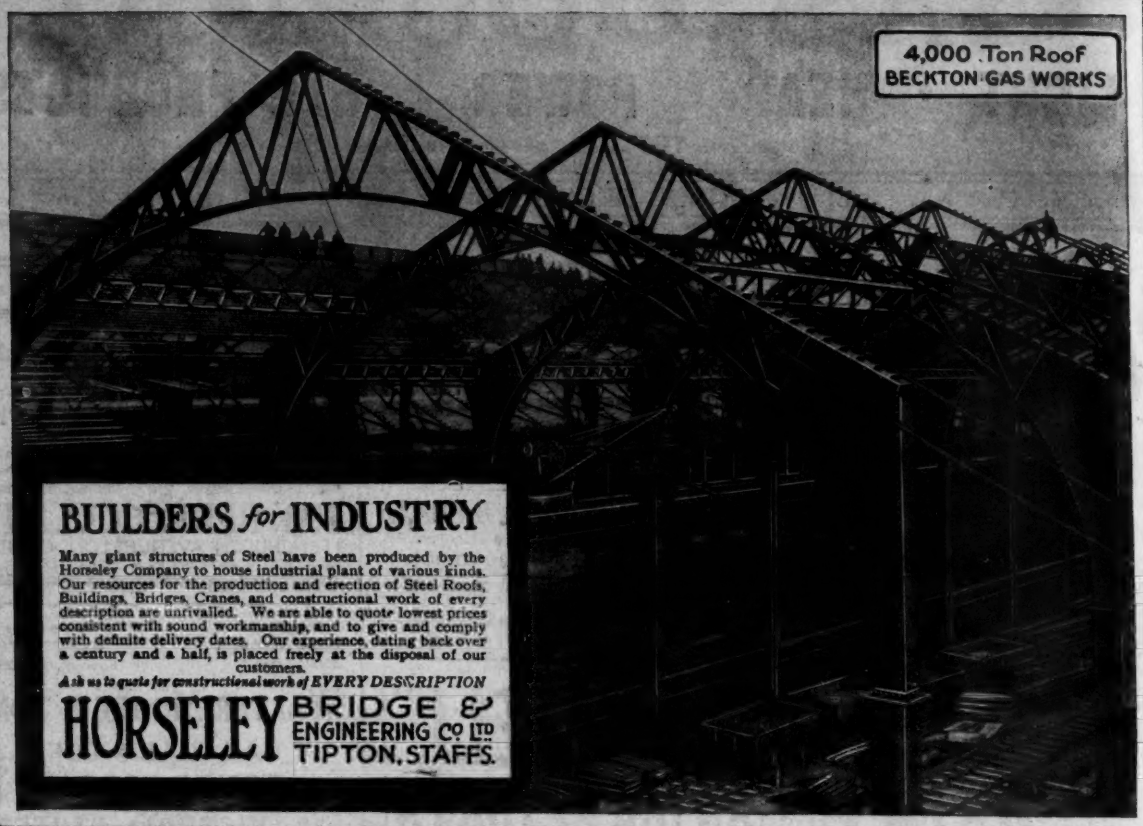
STEWARTS AND LLOYDS, LIMITED, 41, OSWALD STREET, GLASGOW. BROAD STREET CHAMBERS, BIRMINGHAM.
TUBES & FITTINGS for Gas, Steam, Water, &c.

Developing New Business with Hotels.

OUR new pamphlet "HOSPITALITY" tells of schemes for equipping Hotels, Boarding Houses, &c., with Gas Fires, each with a
"RANELAGH" HOTEL METER.
This pamphlet reveals a new source of profit which will instantly appeal to all proprietors of Hotels, &c. Send for copies of this interesting circular, which will develop new business in your district.



GEORGE GLOVER & CO., LTD.
Dry Meter Manufacturers and Repairers.
Ranelagh Works, Royal Avenue, Chelsea, London, S.W.3.
Branches: Ranelagh Meter Works, East Park View, LEEDS;
74, Diamond Street, CARDIFF;
City Meter Works, Port Street, MANCHESTER.



BUILDERS *for* INDUSTRY

Many giant structures of Steel have been produced by the Horseley Company to house industrial plant of various kinds. Our resources for the production and erection of Steel Roofs, Buildings, Bridges, Cranes, and constructional work of every description are unrivalled. We are able to quote lowest prices consistent with sound workmanship, and to give and comply with definite delivery dates. Our experience, dating back over a century and a half, is placed freely at the disposal of our customers.

Ask us to quote for constructional work of EVERY DESCRIPTION

HORSELEY BRIDGE & ENGINEERING Co LTD TIPTON, STAFFS.

HIGH PRESSURE GAS DISTRIBUTION AND BOOSTING.

SEND FOR CATALOGUE ON THIS SUBJECT.

OR ONE OF OUR EXPERTS WILL BE PLEASED TO CALL TO ADVISE.

PLANTS SUPPLIED TO FULFIL ALL CONDITIONS.

OUR PATENT DISTRICT GOVERNORS reduce from any pressure on the inlet up to 50 lbs. per square inch in one stage, down to the ordinary district pressure, and the low pressure is maintained constant, independent of all variations in demand and in the pressure on the inlet side. Absolute certainty of action under all conditions.

HIGH & LOW PRESSURE SERVICE REGULATORS.
REGULATORS FOR METERS, GAS FIRES & STOVES.
PATENT DOUBLE FACED GAS VALVES FOR HIGH & LOW PRESSURES.
RATEAU TURBO GAS EXHAUSTERS FOR BOOSTING, &c.
ROTARY & RECIPROCATING COMPRESSORS.

THE BRYAN DONKIN COMPANY, LTD
CHESTERFIELD.

GAS JOURNAL

LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

(Founded in 1849 as the "Journal of Gas Lighting.")

PROPRIETORS: WALTER KING, LIMITED. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

Telephone: Holborn 6857. —— Telegrams: "GASKING, FLEET, LONDON."

VOL. CLXIV., No. 3163.] WEDNESDAY, DECEMBER 26, 1923. [75TH YEAR.

1923

A Retrospect.

WITHIN a few days, the record of another year will have been completed. Twelve months ago, we were looking forward optimistically, not to any revolutionary improvement in the affairs of the country and of the community, but to a betterment of general conditions during the year upon which we were then about to enter. Those anticipations have in a measure been justified—particularly in regard to the gas industry. Yet, through circumstances which no one could control, the improvement in the general conditions of the life of the country has not been of that magnitude which we might have fairly expected at the close of 1922. Nevertheless, the gas industry itself has little of which to complain. During the year its economic conditions have been materially improved; so much so that it is to-day rendering service to the country at substantially lower prices than ruled twelve months ago. But its efforts and its opportunities have been largely limited by important external influences, and its progress has been curtailed by them. Had it not been for these, the demands upon the industry would have been much heavier, and its ability to serve those demands would have been of a character which would have meant greater economy to the consumers, and greater prosperity for the industry itself. There has been some easing of the prices of materials and of labour; but, on the other hand, there have been long-drawn-out strikes—particularly the dockers' unofficial strike and the lamentable boiler-makers' strike in the shipbuilding industry, both of which had a considerable influence—the latter especially—upon unemployment. Other industries have been affected in still more remarkable degree by the influences of trade abroad and international financial conditions. With something like a million and a quarter of our people still out of employment, naturally a great industry supplying a public utility like gas suffers considerable hindrance to its progress through the depression of demand from manufacture and from industrial workers for domestic purposes. In short, we cannot say that the year which is about to close has done anything great, speaking generally, to relieve the world of its difficulties; and this affects in greater or less degree all individual countries and their respective industries.

A NATIONAL DISASTER.

In this country at all events, there has been a struggle to get as free as possible from the intricate mesh of trouble which hangs about the world. Unfortunately, however, the year's record has to be closed by a reference to the political disaster which took place through a hurried General Election with the view to protecting manufactured goods in this country, in order that some relief might be given to the mass of unemployment which exists, and which throughout the year has been one of the problems to defy solution. Prior to the General Election, we had a stable Government. The result of the election was to give to no one party in the House a majority sufficient to carry on to full extent the national business without the support of one of the other parties. While the Government secured 258 seats, Labour increased its number to 191, and the Liberals to 158; the balance (8) being made up of members representing other political views. This result means that protection cannot be introduced into this country—at any rate, not for long to come; and, therefore, while all other important countries have tariffs against us, this country is an open market for the whole world. Thus, the instability of Government that has in consequence arisen is a serious detriment to our industrial position; and industry therefore cannot expect to receive any assistance from Government, but must do its utmost to work-out its salvation without protective aid. Hence we close the year and enter upon a new one in a cloud of political uncertainty as to what will take place in the immediate future; but, difficult as the position is, the country will do its utmost to ameliorate the conditions which to-day are against us. Another General Election cannot be far ahead, unless there is a working combination of two of the parties. While speaking of general events during the year, we ought to make sympathetic mention of the terrible earthquake in Japan, which involved that country in the loss of much life and property; a rough estimate of the monetary loss being placed at £1,000,000,000 sterling.

THE MOVEMENTS OF COAL.

On this occasion it is not intended to make a long detailed review of the year's events in connection with the gas industry, but to confine this general backward glance over the twelve months to those matters which have exercised, and which are exercising, an influence upon the fortunes of the industry. We cannot do better than start with basic coal. At the beginning of the year, the prices of gas coal for some of the special sorts were being quoted at the collieries from 24s. to 25s. 6d. per ton, while second qualities were ranging in price about 2s. or 2s. 6d. below this. But a little later in the year, there was a trend upwards by 2s. to 4s. per ton; while at the present time, the prices to home consumers may be taken to be somewhere about those which ruled at the beginning of the year. But prices, like qualities, vary so much for different sorts that it is impossible to give any general indication of them.

The trend of prices for export also showed a little variation, but not to any notable extent. For example, in April the average price per ton for exported coal was £1 6s.; in May, £1 17s. 10d.; in June, £1 7s. 2d.; in July, £1 6s. 1d.; in August, £1 5s. 2d.; and in September, £1 4s. 9d. The differences, we think, reflect not so much the operation of the law of supply and demand as the necessity for keeping prices down to a reasonable level to maintain the export trade. The competition for European business from the United States is a very real thing, although in actual business it is not extensive, compared with the export trading from this country. This is an effect of the great coal strike of 1921, when America was able to gauge her abilities to send coal to European countries, and the cost of doing it. Since then the United States coal exporters have not neglected opportunities for getting business in European countries. For example, in the first three months of this year, there were shipped from the United States to European countries no less than 544,038 tons of coal; and we know that several contracts have been entered into since then for the American product. Nevertheless, this year has seen an export of coal from this country larger than has been the case for many years. Up to the end of November, 73,575,713 tons were exported, which compares with 58,243,742 tons in the eleven months of 1923, and 20,351,390 tons in the corre-

sponding period of 1921. The value of the coal exported this year was £92,659,201; in 1922, £65,836,846; and in 1921, £37,585,630. It is rather singular that of the quantities exported that classified as gas coal was in the eleven months of 1922 and 1923 approximately the same—viz., for this year 8,479,743 tons, as compared with 8,439,058 tons in 1922. But the value this year is over £1,000,000 more than the value last year, which shows that, making an allowance for the extra quantity exported, the price per ton this year has ascended somewhat. The actual value of the coal exported in the eleven months this year was £10,297,099; and for the corresponding period of 1922, £9,274,004. One stated reason for the greater total export of coal is the occupation of the Ruhr; but the Board of Trade returns show that this is not the only explanation—a further one being that the British coalowners have very largely recovered the overseas markets which they possessed prior to the outbreak of war. This recovery is partly due to the fact that prices for export have not been unduly inflated; and, on the other hand, buyers abroad show a decided preference for the quality of the British product. Notwithstanding this, a very sharp eye is being kept on the United States overseas coal trade.

At the moment there does not appear to be any likelihood of an appreciable reduction in the cost of coal. In 1922, the cost of production averaged 16s. 10½d. per ton, as compared with an average of 9s. 4d. in 1913. During the current year, the coalowners have attempted to show that there is little chance of realizing any reduction in costs, unless the miners themselves are prepared to work longer hours and increase the output per man. Otherwise, economies must be sought outside the coal industry, particularly in connection with transport. To this end, the Mining Association, working with the large industries of the country, have brought pressure to bear on the railway companies with a view to obtaining a reduction of transport costs. They have been successful up to a point. But the railway companies appear to be prepared to curtail rates for coal, coke, and other materials and goods only by a piecemeal process, which does not give any substantial or universal satisfaction. A result of this is that pressure continues to be made upon the railway companies to give further concessions, in order to do more to help in the revival of the industries and trade of the country. Just before preparing this retrospect, an application was heard for the abolition of the 2d. flat rate in respect of coal, coke, and patent fuel, carried on the Great Western Railway; but the Railway Rates Tribunal rejected the proposal. As we write the Tribunal are commencing the hearing of the application of the Mining Association of Great Britain and of the National Association of Coke and Bye-Product Plant Owners against all the railway groups for the cancelling of the 2d. flat rate on the materials mentioned above. The application is being made under section 60 of the Railway Act. It may be explained that two-thirds of the flat rate has already been abandoned by the Railway Companies, and only one-third—the 2d.—remains.

While speaking of this matter, we ought to acknowledge that, in some of the coal-fields, the men have worked loyally and well. It is true that per worker we are still some distance away from the outputs of 1913, and the still better year 1907. In the first three months of the current year, the output per worker was at the rate of 240 tons a year; and there were then 1,156,244 men at work in the coal-fields, or about 60,000 more than in July, 1914. In 1913, the average output per man was 259 tons; in 1907, it was 289 tons. The difference of 19 tons compared with 1913, or the 49 tons compared with 1907, multiplied by the number of men at work in the first three months of this year, indicates the vast difference that could be made in the costs of production if the outputs of those years were being realized at the present time. The outputs of coal, measured by the standards of recent years, have been well maintained. For instance, during the week ended Oct. 20, the production was 5,678,600 tons of coal; the wage-earners in the industry being 1,174,900. In the week ended Oct. 27, the output was 5,673,500 tons; the wage-earners being 1,175,500. The highest output this year was in the week ended April 21—viz., 5,824,900 tons.

A matter that has led to a great deal of unsettlement in the coal outlook has been the persistent efforts by the Miners' Association to secure an amendment of the national coal agreement. This started just before Christmas of last year, and was the subject of much discussion at the Miners' Federation Conference at Blackpool early in the year, and at the Annual Conference at Folkestone later on. Some of the extremists were in favour of giving the necessary three months to terminate the agreement; but the more sober-minded of the leaders preferred that every endeavour should be made to modify it in a manner which would give satisfaction. Their views have resulted in almost continuous negotiation between representatives of the Mining Association and of the Miners' Federation, with a view to arriving at some amicable agreement. One must acknowledge that the representatives of the Miners' Federation have made efforts to find a peaceful solution; but there is evidence of the dominating influence of extremists, who cast a shadow over the negotiations and influence their possible results. The national agreement provides for a minimum standard wage, as well as for the sharing, on a percentage basis, of any surplus profits that may be made. The Miners' Federation preferred the requests: (1) That the standard profits should be 13 p.ct. of the standard wages, instead of 17 p.ct. (2) That the surplus after meeting standard costs should be divided between wages and profits in the ratio of 83 to 17, instead of 87 to 13. (3) That the minimum wage should be standard wages *plus* 40 p.ct. thereof, instead of standard wages *plus* 20 p.ct. thereof. In respect of the change in the percentage division of surplus profits, the representatives of the coalowners were prepared to make some concession; but they refused to comply with the request as to the increase of the minimum standard wage. Their reason for this is that there is a crying need in the country for the price of coal to be kept as low as possible; and the increase of the minimum would at once have the effect of sending-up the price to the detriment of consumers generally, which would not be to the advantage of the country's trade.

The upshot of this is that a ballot of the men is to be taken, with a recommendation that they should vote in favour of giving the three months' notice for the termination of the agreement. The unfairness of such advice in the taking of a ballot is too obvious to need any comment. But anyway the result of the ballot cannot be known until early in January; and thereafter, if the decision is in favour, three months' notice will have to be given before anything of a serious nature can arise, if there is constitutional procedure. The length of this period will anyway see us through the winter season; and it is hoped that it will suffice to bring the parties to a common ground of agreement regarding the questions at issue.

During the year, a larger proportion of the better-class coals than was formerly the case has been purchased by gas undertakings at home—for manifest reasons connected with gas and coke manufacture, and in view of conveyance rates for coal being still what they are. Another notable thing in connection with coal has been the greater attention that is being paid by gas undertakings to its testing. Various papers and articles have been published concerning the methods of testing practised by those responsible for this work.

On the Manufacturing Side.

Although our columns this year have borne witness to the fact that a large amount of construction has been going on, particularly in connection with the carbonizing department, there is room at the works of contractors for gas plant for much more employment. It is considered from the experiences of the year that the time is particularly opportune for the managements of gas undertakings to deliberate upon the factors regarding the carrying-out of renewals or extensions of works. Money is now as cheap as it is likely to be for a long period ahead. The prices of materials have fallen considerably, as have the costs of labour. As a matter of fact, the probability is that, if anything, the prices of the present will harden, having in view the strenuous efforts that are being made to relieve unemployment; with a further revival of trade, the demand for materials will without doubt largely increase. There is also the point as to the economies that can be effected by the adoption of more efficient plant. It is oftentimes wise to incur capital expenditure if an economy can be shown over existing plant. It is also well known that many gas plants are not being worked to the state of efficiency to which they could be raised by a judicious expenditure upon modernization. Taking these things into account, it may be that the administrators of more gas undertakings, advised by their competent engineers and managers, will find it to advantage to enter upon reconstruction or extension schemes. This

matter was emphasized very strongly at the annual meeting of the Society of British Gas Industries by Lord Weir and certain of the members.

Among the work actually completed this year, prominence must be given to the many important vertical retort installations which have been finished and brought into use; and in conjunction with them a number of economies have been introduced—the product of the experience of years. There is still a large amount of research work in hand which may result in invention, with the view to securing greater economy and efficiency in gas production. Among new gas producing systems which have been noticed this year have been the Marshall-Easton process of low-temperature carbonization by the medium of water gas. Messrs. Travers and Clark's regenerative coal gasification system has also attracted a considerable amount of attention, more particularly in view of the results which have been obtained by it at the Aylesbury Gas-Works. Further information was published regarding Lowe's combined gas plant, which also gives good therm yields. Mention, too, has been made of the lead-bath low-temperature carbonization system; and attention has been given in several papers to the more valuable results achieved by water-gas plants worked under proper control. Complete gasification has had several references; but progress in adoption is not yet of a striking order. No advances appear to have been made with the oxygen-steam process of gas manufacture, to which we have all been looking with so much interest and expectation. As a matter of fact, a paper prepared by Mr. T. Campbell Finlayson, giving an account of researches which he had carried out for the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., and which surveyed the existing and possible oxygen-producing processes, did not give us much hope of obtaining oxygen, by a simple process, at a figure which would make its use in carbonization a commercial success.

Low-temperature carbonization has also been prominent—in papers and in expressed opinions as to its future value; but nothing much of a concrete nature has yet resulted from all the investigation that has taken place and the money that has been spent upon the various systems. But we are promised big things in the near future. Some authorities, however, maintain that low-temperature carbonization cannot stand alone; that it must be adopted in conjunction with some other process, to make it a commercial success. Others are equally confident that there are too many factors against it to justify any expectation that it will pay in any form whatever. Others again are still full of hope. The Fuel Research Board appear to be taking a middle course in connection with the matter; and they are investigating at the Fuel Research Station new methods of operation, with the view to making better use of various grades of coal, so as to realize a profitable issue from low-temperature working. In their present experiments, they are using vertical retorts specially devised, as described in a special article in our columns [Oct. 17, p. 184], which gave an account of a visit to the station. For the purpose of these retorts, prebriquetting by pressure of mixtures of coal is carried out, and the briquettes are charged into the retorts. This admits of fairly large-bulk carbonization; and the open character of the charge permits the free transmission of heat through it. By this means it is hoped to secure homogeneous briquettes of uniform physical characteristics throughout. While speaking of the Fuel Research Board, mention may be made of the resignation of the first Director, Sir George Beilby, F.R.S., whose voluntary and heavy work in connection with the establishing of the station and the prosecution of the researches at it have added to that great reputation which he already possessed in the scientific world. He still continues on the Board, and his advice is always at disposal. To succeed him as Director, his former assistant, Dr. C. H. Lander, has been appointed. Several changes have also been made in the constitution of the Advisory Committee, and on this the gas industry is well represented.

Economy and Efficiency—Particularly Thermal.

A feature of the year's work has been the considerable attention paid to the question of economy and efficiency in the processes of gas manufacture. This applies not only to carbonization, but to the other sections of the work, and there is no doubt that this has been largely stimulated by the Gas Regulation Act. Throughout, we see a greater recognition of the necessity for control, if maximum efficiency is to be obtained from plant and materials. In this connection, mention may be made of the large growth in the adoption of waste-heat boilers on gas-works. At the Fuel Research Station a waste-heat boiler has been found to be highly remunerative through the large saving of fuel effected by it. There are many engineers who, acknowledging that these boilers are of considerable value in connection with water-gas plants, are dubious as to whether they should be adopted as adjuncts to processes of carbonization. Perhaps they except vertical retorts; certainly there are many engineers who doubt the expediency of their utilization in connection with horizontal retorts. Their view is that the direction in which thermal improvement should be carried is to try to effect greater economy and efficiency within the settings themselves. It is to be hoped that efforts will be made to see what can be done in this direction; but there can be no questioning the fact that the waste-heat boiler in association with vertical retort-settings is a great economy. One outstanding contribution to this subject of the utilization of such boilers in conjunction with verticals was that of Mr. J. S. Thorman, to the Southern Association of Gas Engineers and Managers. It was quite a classical paper; and though some of the figures may be open to criticism, and have been criticized, there can be no doubt that the investigation and the work described by the author will have great value in promoting the adoption of this method of securing greater economy in gas-works.

One plea that Mr. Thorman made was that work should be directed to securing from the available waste heat the highest possible efficiency. A striking point in his paper was the method that he adopted to reduce the radiation losses from the waste-gas mains. He lines the steel collecting mains with porous diatomaceous insulating bricks, which he has found are most efficient non-conductors. The saving he showed in this detail suggests that greater attention should be paid to the reduction of radiation generally from retort-settings. In this relation reference may be made to a small point upon which information was obtained during the above-mentioned visit to the Fuel Research Station. There they have abandoned in their new vertical settings for low-temperature work the metal sight boxes, and have adopted fireclay boxes and plugs. By so doing, they have reduced heat losses by no less than one-sixth.

Another economy which has made considerable progress during the year has been the introduction of washing plant for the recovery of usable coke from furnace ashes. We think that as time passes this will be regarded as an indispensable operation in every gas-works. In this connection, some particulars have been given this year of the magnetic separation of coke from clinker; an installation at the Berne Gas-Works, Switzerland, being described in our columns.

Gasholders and Sheeting Material.

The subject of gasholders has had rather more than usual notice. More has been heard of the 12½ million c.ft. holder at the Sydney Gas-Works; and at the Belfast Gas-Works, the largest spiral-guided holder in the world was inaugurated in November. It was the subject of close inspection by the members of the Institution of Gas Engineers, on the occasion of their annual meeting in Belfast, under the presidency of the Engineer and Manager, Mr. J. D. Smith. This vessel has a capacity of 7 million c.ft., and has about it several notable engineering features. It is likely, too, that we shall hear in this country more of tankless gasholders, which on the Continent have already received a considerable amount of adoption.

Regarding the structural materials for gasholders, in his address at the annual meeting of the Victorian Gas Association, Mr. P. C. Holmes Hunt (who, by the way, had a trip home this year) referred to the corrosion of gasholder plates. He stated that there were experiences in Australia which indicate that holder plates of wrought iron have a much longer life than those constructed of mild steel. It is found that while the wrought-iron sheeting has a life of somewhere near fifty years, the life of the mild-steel sheets does not exceed thirty years. At the last meeting of the Society of British Gas Industries, Mr. R. J. Milbourne and Mr. Samuel Cutler called attention to the same points, and urged that a critical investigation should, in view of the money involved, be made of the matter, together with the

claims for Armco pure iron sheeting. Another interesting point is that, in Australia, welding of gasholder sheets has been introduced, instead of riveting; but Mr. Holmes Hunt has some fears as to whether welding affects the nature of the material, which may have an adverse influence in connection with corrosion.

The Products of Carbonization.

Generally speaking, the year has seen a great advance by gas undertakings in therm production per ton of coal carbonized; and this is a direction in which the economy and efficiency of gas manufacture will in the aggregate make still more rapid strides. More attention, too, is being given (and not before it was needed) to the quality of coke. We have had information from industrial users that they have experienced a great improvement in the quality during the last year or two; and this is probably largely due to the purchase of better-class coals, and to the reduction of the moisture content. Interest has been directed to the question of the dry quenching of coke, particularly by what is known as the Sulzer process.

A feature of the year in connection with coke has been the considerable demand for it for industrial purposes, in which connection we may refer to the little book which we published for Mr. G. M. Gill on "Coke for Steam-Raising." This utilization of coke has made very rapid strides, and particularly (as Mr. E. W. L. Nicol, Engineer and Fuel Expert for the London Coke Sales Committee, has recently reminded us) for power station purposes. The duty obtained with it is high, and, therefore, as a fuel it is very economical. As a matter of fact, just recently in many parts of the country there has been an absolute shortage of coke. In other words, the demand has greatly exceeded the production. Possibly some of this is due to the export of gas coke; the demand from abroad having been considerably augmented. For instance, during the eleven months of this year to the end of November, there were exported from this country no less than 1,114,885 tons, which we suppose may roughly be taken to be about one-eighth of the output for sale of the gas undertakings of the country. The value of this quantity is given in the Board of Trade returns as £1,801,504. In the corresponding period of 1922, the export of gas coke amounted to 816,322 tons; while in the similar period of 1921, the quantity exported was 391,189 tons. We are making progress in this direction. In the course of the year, the Lancashire Commercial Section of the Manchester District Institution suggested a scheme (which could be applied to all parts of the country) for the pooling of surplus coke to be disposed of by shipment to other countries; but so far we have not heard of any general movement in this direction.

Regarding tar, a new specification for tar for road use was issued by the Ministry of Transport, in which connection we may remind readers of the novel dehydrating process, as practised at the Glastonbury Gas Works, which was described in our issue for Oct. 24. This is a continuous system; the still being filled with a metal having a low melting-point, over the surface of which heated metal the tar flows in a very thin layer. The dehydrated tar passes to a cooler; while the light oil and water vapours driven from the layer of tar travel from the top of the still to the condenser, and then to the separator—the light oils passing on to storage. The process appears to be extremely simple; and one man can easily manage the working.

Comparing our market reports for January with present ones, it is seen that the price of tar, which at the beginning of the year stood at from 72s. to 77s., was quoted last week at from 64s. to 69s.—a drop of 8s.; while pitch, which in January stood at from 117s. 6d. to 127s. 6d. according to geographical position, was quoted last week at from 92s. 6d. to 100s. Speaking of pitch, during the year the South Wales Patent Fuel Manufacturers tried to get the Ministry of Transport to do something to limit the demand for road-making purposes; the object of this apparently being to obtain pitch at a cheaper price for the manufacture of briquettes. The patent-fuel makers stated that pitch was not only difficult to obtain, but was at an extremely high price; and therefore their particular industry was being injured. Naturally the Ministry of Transport could not interfere in a purely commercial matter of this kind. The fact that in 1922 the output of briquettes showed an increase of no less than 22 p.ct., is an indication that the complaint of the manufacturers had no very substantial foundation.

With regard to benzole, some very striking information was given by Mr. W. G. Adams, on behalf of the Benzole Association, to the Departmental Committee on the Taxation and Regulation of Road Vehicles, respecting the potential productive power of the country in this particular, compared with the actual production. There has, of course, been a considerable falling-off in the output of benzole owing to the low price obtainable for the crude product, which condition has been accentuated during the year by the rapid fall in the price of motor spirit. At current prices, most gas undertakings find it preferable to retain the benzole in the gas, as its therm value is more to them than the revenue they could derive by its extraction.

As to sulphate of ammonia, in the annual report of the Chief Inspector of Alkali Works (Dr. T. Lewis Bailey), reference was made to the haphazard methods practised by several undertakings in the production of sulphate of ammonia; and he particularly criticized the excessive quantities of lime and steam that are used. No doubt his criticisms are well justified in certain cases; but if we except the smaller undertakings, some of which do not find it profitable to make sulphate at the present cost of sulphuric acid and other materials, and with the low price obtainable for sulphate, it may be said that most gas undertakings are showing a greater production efficiency than previously. As a matter of fact, in connection with vertical retort working with steaming, very high yields are being secured at the present time. From Scotland, information has been published as to 49 lbs. of sulphate of ammonia being made per ton of coal carbonized at the Coatbridge Gas-Works, and 42 lbs. at the Motherwell Gas-Works. But in these cases there is heavy steaming in vertical retorts with fairly moderate temperatures; whereas it is generally admitted that to get good water-gas results in a vertical retort, high temperatures are necessary. Incidentally, reminder may be given of the fact that Mr. E. Lloyd Pease described in our columns the "N.P.K." fertilizer, in which he is concerned as the inventor, and which he claims is an economical material which can be made by any gas or coking works. The advantage in engaging in ammonia liquor concentration was explained by Mr. A. S. Nisbet at a meeting of the North British Association of Gas Managers.

Reverting to sulphate of ammonia, at the beginning of the year there was expectation of a much larger demand; and this has materialized. Farmers at home have realized more and more the advantages to be obtained by its use. Further, while the home demand has been improving, that from abroad has also risen considerably. The Chairman of the Sulphate of Ammonia Federation (Mr. D. Milne Watson) says this larger demand from abroad is due very materially to the fact that the quality of the British product has so much improved. Quite 70 p.ct. of the output is now acid-free, of neutral quality, and 25¾ p.ct. ammonia. This quality is a great attraction to buyers abroad; but there is warning that it must be maintained, although competitive prices will have to be arranged in view of the progress of nitrogen fixation. There is no question that, from the fixation plants in different countries, there will be considerable competition in future in the fertilizer markets; and therefore it will be necessary to proceed very diplomatically in order to retain those we have, and to secure a good part of any further business that may be going. Coincidently with the movement towards larger supplies of nitrogenous fertilizers, the demand throughout the world is increasing. This is fortunate; but how long a balance will be maintained cannot be stated. However, we may rely upon the Sulphate of Ammonia Federation keeping a very sharp eye upon all movements which will in any way affect the commodity. As to prices, in January and February, that fixed for home delivery for neutral 25¾ p.ct. quality was £16 18s. But the price had to be further reduced; and in July and August, £14 15s. per ton was the arranged figure. In October, it was £14 12s. 6d.; but in November, the price had returned to £14 15s. Of course, the export prices were higher than these; and thus an advantage is secured by sulphate of ammonia manufacturers in being associated with a Federation whose functions comprise not only propaganda, but commercial activities aided by facilities for obtaining world-wide intelligence.

Up to the end of November, no less than 230,598 tons of sulphate of ammonia had been exported, as compared with 127,338 tons in the corresponding eleven months of 1922. Much has been said during recent months as to the need of far greater economy in connection with the pro-

duction of sulphate of ammonia; and at the last meeting of the Sulphate of Ammonia Federation, the Chairman particularly urged that sulphuric acid makers should further bring down their prices, as he is by no means satisfied that they are at the level they could attain for such excellent customers as producers of sulphate of ammonia.

GAS TRADING AND POLICY.

A much broader outlook prevails in the gas industry now regarding the gas-trading part of the work. It is being very generally recognized that the gas sales and service end is really the vital part of the operations of a gas undertaking, and that upon its maintenance and progress the industry depends. With this in view, part of the administrative policy to-day is to give greater recognition to this section of the business, to adopt new methods in connection with it, and to facilitate the pushing of business into new channels. Important as is the price of gas as an incentive to the light, heat, and power business, it is not the only consideration. Satisfaction of the consumer through economy and efficiency is of equal importance. Cheap gas and inefficient and misused appliances are inconsistencies; and the latter injure the good that the former might do. This is being impressed more and more upon gas administrations. So it comes about that the standards of efficiency in men, appliances, and methods are having a consideration bestowed upon them that they have never obtained before.

But about gas prices. The economic circumstances of the year have been favourable to the reduction of gas charges; and throughout the country, the consumers have received benefit. The aggregate revenue represented by the reductions made this year must have been enormous. The much-maligned therm is to-day looked upon as a blessing which was formerly disguised by a constitution and name that were unknown to the people. But it is more to them now than a cubic foot was in the days before its advent. They know now that it is something more definite in value than the cubic foot, and that its price is subject to falls as opportunity permits, just as was the old volumetric unit. The prices of therms have receded considerably. We can talk now of figures as low as 5d. at Bath; of an average figure at Widnes, taking industrial and domestic consumption together, a fraction below that. In other places, 6d., 7d., and 8d., or thereabouts, are common figures; and a large proportion of the gas sold in London and the suburbs is at or near 8d. There are numerous places between that price and 1s.; but conditions of production and supply vary appreciably according to geographical and business circumstances.

Things are going on very well in this direction; but there are progressive gas engineers who think that price methods can be changed with advantage to induce increases in the volume of business. Mr. W. B. M'Lusky, of Halifax, is the protagonist in this matter; and he is a persistent one, whose experience is for him a dynamic force. He has introduced at Halifax what he calls the "standard requirement" method of charging; the standard requirement being based on the floor area of the living and reception rooms. How that factor is used for ascertaining the price that has to be paid for gas must be ascertained by reference to the details that have been published in the "JOURNAL" in the course of the year. The scheme has been very popular; and Mr. M'Lusky claims for it a big influence in developing consumption. But he has concluded that it can be carried further; and this is going to be done by the introduction of a two-part charge—the "standard requirement" being used as the basis for a fixed charge, with (as the second part) a low price for the gas consumed. Under this, if a householder is fortunate in having for comfort and health a large area in his living and reception rooms, he is unfortunate in the fixed charge he will have to pay for gas; if he is fortunate in the amount of the fixed charge he has to pay—well, he is unfortunate in having a restricted area in living and reception rooms. However, Mr. M'Lusky holds that the end of consumption development justifies the means of securing it. It is popular and satisfactory in Halifax; and Mr. R. H. Duxbury has borne testimony as to similar experience with the standard requirement scheme at Batley.

COMPETENCE AND NEW METHODS.

As we were saying, price without efficiency in use is not enough. The two things must go together to achieve the maximum progress. The industry is veering—perhaps not rapidly, but surely—to the views of those advanced men who have realized that service among the consumers is necessary to the future progress and prosperity of gas supply. Things are not now as they were. The plain homely fittings of the past have given place to a range of domestic and industrial appliances undreamed of at a time within the memory of some of us. The year has accentuated certain facts. One is that we have the power to retain lighting by means of the good-quality illumination we have to offer, if only we go to work the right way. We have the power to replace the use of raw coal at a faster rate than we are doing if only we go to work the right way. We have the power to repress the competition in light, heat, and power of the electrical people, and that of the coal merchants in heating, if only we go to work the right way. The propaganda of both competitors has been intensified during the year; and that propaganda has not been altogether free from black and unpleasant spots. But let that pass. It all means the revision of policy in respect of the consumers. A revision of policy may cost a fraction of a penny per therm, but the satisfaction of the consumers is worth more than that. Satisfaction is a protector of business; and satisfaction is an excellent advertiser. Neglect of expenditure in this direction may mean a loss to, or a set-back of, business much greater than is represented by the outlay. This means systematic maintenance, and by competent men.

The industry is seeking by educational means to secure greater competence—technical and commercial—in the *personnel* of gas service departments; and the Gas Salesmen's Circles, which have taken such remarkable root, and show so much vigour in growth and in valuable work, are building-up knowledge on the sales side and raising the level of competence in manner formerly impossible through the lack of opportunity for conference, discussion, and dissemination of practical experiences. We owe much in connection with the inauguration of the Circles to the "B.C.G.A.," the Chairman of the Executive Committee (Mr. Goodenough), the Manager (Mr. W. M. Mason), and the Secretary (Mr. J. C. Walker). We could write extensively on this topic; but the occasion is not opportune—not even to do more than mention that wonderful conference of gas salesmen from all parts of the country that was held in Birmingham during the run of the National Gas Exhibition. It showed the large vitality and virility there is in the "gas service" region of the gas business, if only those characteristics are given scope and fair play. There must be care in having suitable and efficient men for the responsible work of advising and dealing with consumers—present and prospective. Having the men, the proper methods are required; and much has been written on this subject, though here again methods must be shaped to conform to the needs of the locality.

OPPORTUNITY.

It is a big and a worthy field that the industry has for new business. There is the lighting, heating, and power to be preserved and extended against a vigorous competition. There are the millions of tons of coal used for domestic and industrial purposes to be superseded by—properly used—highly efficient gas. Public education has during the year been going on apace in connection with smoke abatement; and a new Smoke Abatement Bill was introduced into Parliament, with which few were satisfied, because it was thought to go too far against industry, and not far enough in respect of domestic smoke. Local authorities, technical organizations, and public men have been moved in this matter. Pressure must continue to be applied until something real is done in this matter, in the interests of the health of the community and of the saving of property and labour. The "B.C.G.A." recognized their part in the propaganda and movement by the character of their District Conferences early in the year; and a great point was made in that highly successful annual conference at Birmingham, held under the presidency of Alderman J. H. Lloyd, M.A., the Chairman of the Birmingham Corporation Gas Committee, to illustrate by actual example the divers ways in which industry and trade can raise both economy and efficiency by the application of gas in place of smoke-producing fuels. There is a proved economy in the gas-heated furnace and boiler, and in the gas-engine; but a lesson of the conference is that the maximum satisfaction resides where the gas undertaking provides for periodical examination, regulation,

and advice by trained men. It was also shown to be easy to defeat the electrical competitor by, in large establishments, the generation of electricity by gas-driven generating sets. In domestic, street, and shop lighting, our competitors are at present particularly active. There were signs of this in the autumn. There is work to be done in all these directions. "Maintenance" sums-up that work; and maintenance has been the subject of discussion at various meetings of Associations—District and Junior—and Salesmen's Circles. We expect to see the policy grow, and at quickened rate, because gas administrators are accepting it as a correct development. In domestic cooking, the competitors are also active. They want the business, to help to fill the day valleys in their output curve.

Higher Efficiency Appliances.

This brings us to the point that the industry is fortunate, in the competition to-day, in the possession of higher efficiency appliances in all fields—lighting, cooking, heating, power, and furnaces. Look through the records of the "Journal" for the year; and it will be found that these things exist to-day in form and efficiency never before at hand to help in our progressive work. Some of the older appliances degrade the potentialities of gas in the matter of efficiency. Such appliances must be displaced or modernized as opportunity permits. The National gas cooker has had much prominence given to it during the year; and experience with it is beginning to grow. Its capabilities are now under critical test. We are not going to specify any particular types here, but it should be mentioned that certain of the makers have brought out cookers wonderfully attractive and highly efficient—both thermally and in respect of serviceability. In comparison, that which at one time of day was thought to be *ne plus ultra* is now among the obsolete—particularly so in respect of hot-plate efficiency. Boiling-rings and the fashioning of the grids have had higher merit introduced into them, to the end that from the former degradation of potential heating value an economy has been rescued which has made all the difference to the duty rendered, and to the satisfaction of the users. In passing, we may refer to the considerable interest imparted during the year by Prof. W. A. Bone in a lecture on surface combustion. In this he described the recent developments that have been made in radiophragm heating.

There is satisfaction for the industry in the knowledge that in the implements of their commercial activity, there is progress all along the line. But a word of warning, if it is needed. We have had sufficient—more than sufficient—of ill-designed, cheaply constructed, and low-efficiency appliances. Let the purchase of those things be for ever abandoned. Where it is not, the lessons of the year will have been lost. Good quality and efficient appliances pay for themselves. They require less attention, they last longer, the costs of maintenance are lower. There is in such conditions an over-all economy. It must not be forgotten that prices have lately stiffened for the materials from which gas-consuming appliances are made. But this must not permit of any back-sliding from patronizing high standard and good quality goods. The additional cost is money well spent. It produces its interest in savings year by year and day by day. Good quality at a fair price is better than poor quality at a somewhat lower price. The difference in quality and efficiency is generally greater than the difference in price. A good article always lasts longer, requires less for upkeep, and gives more satisfaction. The industry's duty is to raise the standard of gas-use throughout the various applications.

Exhibitions—This Year and Next.

The propaganda of the industry has developed in marked degree. There is an enthusiasm in this which has expanded with time. This year has been notable for its exhibitions and public displays; outstanding being the thoroughly representative, skilfully organized, National Gas Exhibition in the Bingley Hall, Birmingham—the central figure in the work of which was Mr. R. J. Rogers, Fittings Superintendent of the Birmingham Corporation Gas Department. The exhibition had a highly successful run—successful in respect of numbers of visitors, interest evinced, and the business which resulted to the advantage of the gas industry generally. We heartily congratulate all who were in any way associated with that brilliant achievement. Among other exhibitions held during the year in which gas had good part were the Ideal Home Exhibition, the Shipping Engineering Exhibition, and the Food and Cookery Exhibition. At many local exhibitions connected with health and the preparation of food, the gas undertakings missed no opportunity of presenting their capacities for work in domestic and trade service.

And now we have to turn to the plans for the industry's joint Gas Exhibit at the British Empire Exhibition at Wembley next year. From the inception of the idea that the exhibition would not be complete without gas, as a public utility, having its part in the display, there has been a considerable enthusiasm shown in the project throughout the industry—an enthusiasm which, within our long experience, has had no precedent in respect of universality. All the big gas organizations are backing it up. Mr. D. Milne Watson, the Governor of the Gas Light and Coke Company, is the Chairman of the Gas Exhibit; and Mr. F. W. Goodenough is the Chairman of the Organizing Committee. The appeal which was made for funds bears the signatures of the Presidents of all the central organizations, including that of Mr. Milne Watson, Dr. Charles Carpenter, as President of the Gas Companies' Protection Association, Mr. Samuel Tagg, as President of the Institution of Gas Engineers, Mr. H. Wade Deacon, President of the British Commercial Gas Association, and Lord Weir, President of the Society of British Gas Industries. So far, there has been a very hearty response. As a matter of fact, we were able to announce in last week's issue of the "Journal" that promises had been secured amounting to nearly £50,000 before the general appeal was issued. But many more thousands of pounds will be required to carry out the big scheme not only at Wembley itself, but in advertising it throughout the land. It is, therefore, hoped that every gas undertaking will do its part in contributing to the proposed expenditure. The electrical industry are making a considerable display both from the engineering point of view and from that of the utilization of electricity in domestic and industrial service. The gas industry must be in no respect behind its competitor in demonstrating to the large public that will visit Wembley during the six months' run of the Exhibition the advance in efficiency and service which the industry has attained, and which it is hoped by every means in its power to advance still further. It may be mentioned that this is not a matter in which gas supply undertakings alone are concerned. The Society of British Gas Industries are represented both on the General and Executive Committees; the members of the Society realizing that their interests are bound-up with the promotion of the sales of gas in this country, as are the interests of all sections of the industry. During the course of the Exhibition, there will be conferences in connection with the gas exhibit. There will also be larger conferences of a more general nature—one of them being the World Power Conference; and in this it is hoped that gas will take its part, although originally (until Sir Arthur Duckham publicly called attention to the matter) gas was not specifically mentioned in connection with it.

The Gas Regulation Act and the Therm.

At the beginning of the year, the inquiry into the question of the charges for gas under the therm system had not been concluded; but the Departmental Committee came to the end of their task of receiving evidence by the close of January. Their report was issued early in March; and it completely vindicated the therm. The great point about the report was the first recommendation—that the method of charging for gas on the therm basis should be continued, and extended to all statutory gas undertakings within the scope of the Gas Regulation Act. There were other recommendations referring to such details as the meter cards and the form in which accounts should be rendered to the consumers. We will not now traverse the report. This was done at the time it was issued; and the points of the important document are all well in the minds of the men concerned in the welfare of the industry. Since the report was issued, very little has been heard antagonistic to the therm; in fact, the therm appears now to have settled down into the customary place of the cubic foot. As time progresses, the value of the therm is being accentuated by experience. In the technical and commercial work of the industry, it is also found to have an important place—having provided a reliable basis for comparisons as to technical

results and costs, both capital and working. At the last meeting of the American Gas Association, Dr. E. W. Smith gave an account of experiences with the therm in this country; but, in our opinion, he did not altogether reflect the views that exist here regarding the importance of the therm in the operations of the industry.

Up to the end of Dec. 31, 1922, the Board of Trade had issued, under section 1 of the Act, no less than 368 Orders; and under section 10, 80 Special Orders—the Orders under section 1 representing about 60 p.ct. of the gas supplied in Great Britain by statutory concerns. Almost week by week since then further Orders, as notified in our columns, have been granted, and the figures referred to above will have been considerably augmented by the work of the past twelve months. Exactly by how much, we do not at the moment know; but very shortly it will be possible to make a calculation. Up to the time of the issue of the report by the Departmental Committee, comparatively few municipal authorities had made application for Orders under section 1. Since then, a deputation have had an interview with the Director of Gas Administration (Mr. H. C. Honey); and from what he said to them, it is clear that the Board hope that all municipal authorities will make voluntary application, so that the compulsory powers vested in the Board may not have to be exercised. But there is no question that—in view of the recommendation of the Committee that all statutory undertakings should be brought on to the therm basis—the Board will work for the co-ordination of gas supply throughout Great Britain. Incidentally, it may be mentioned that, up to the present, what is known as the Gas Fund (which makes provision for the salaries, remuneration, pensions, and gratuities of the Chief Gas Examiner and the Gas Referees and their assistants) has been provided by the contribution of 3s. per million c.ft. sold by those undertakings to which Orders have been issued; but from Jan. 1, under the powers of the Gas Regulation Act, the Board of Trade have decided to reduce the payment to 2s.

The Gas Referees have been extremely busy with their work during the year; and we have had the opportunity of publishing certain of the documents which they have issued—for instance, the new notification fitted to current circumstances, together with a memorandum as to the appointment of gas examiners, and an example of one of their prescriptions. In May we published the rules which the Board of Trade have laid down for making applications to amend Orders; and the question of the revision of the early standard prices fixed per therm has received a great deal of prominence. It is generally recognized that, these standard prices having been settled at a time when costs were very high, there would have to be some modification in them. The London County Council made application for the revision of the standard price of the Gas Light and Coke Company, as well as of that of the Commercial Gas Company. An inquiry was recently held into the application so far as the former Company are concerned; and it was then found that the views of the Council and of the Company were approximately the same as to the amount by which the standard price should be reduced, based on the costs of materials, labour, &c. But a question of principle was raised by the Company—one which is of vast importance to all the gas companies of the country working under the therm system. The County Council suggested that a fair standard price would be (taking into account present costs) 10·8d. per therm. The Gas Light and Coke Company submitted 11d., *plus* 0·4d., which they maintained represented economies that had been made in working through efficiency of management. It is important that, in connection with the operation of the sliding-scale, allowance should be made for the effects upon costs of good management, seeing that in no other way can the proprietors secure any advance in their dividend during these times if standard prices are to be cut down in strict proportion to the actual reductions of costs of materials, labour, &c. However, the upshot is that the Board of Trade have given notice that they propose to substitute 11d. for the present 15·2d. per therm; and this, we submit, does not take into account the economies in costs effected by efficient management. Those undertakings with prices coming under revision will do well to read an article by Mr. G. Evetts, which appeared in our issue for Dec. 12.

One other point over which there has been some feeling in the gas industry is that the Parliamentary Authorities have given greater latitude for opposition in the case of Special Orders; and the result is that the simplified procedure which it was hoped would apply to such Orders through the Board of Trade, has been rendered more complicated and expensive in the case of opposition by the ability of opponents to appear against Orders in Parliament. It is felt that this is unfair, and has imposed upon gas undertakings a position of a more onerous character than was the case when promoting Bills in Parliament which were opposed.

We are still waiting for the recording gas calorimeter to be prescribed by the Gas Referees for official purposes. Prof. Boys has informed the industry that there have been important developments in the calorimeter which led to the postponement of the official testing of the instrument; and in his view (with which there will be general agreement) it was better to defer the prescription of calorimeter until there was satisfaction that it had reached a state of perfection.

Those readers who desire a compendious history of the steps which led up to the passing of the Gas Regulation Act, will find it in the paper by Mr. Harold E. Bloor read at the Public Works, Roads, and Transport Congress [see "JOURNAL" for Dec. 5].

CARBON MONOXIDE.

During the year there was a revival of the agitation respecting carbon monoxide. It arose principally through the breaking of a gas-main in Bethnal Green, and the percolation of the gas through the sub-soil of the road into adjoining houses, with the result that there were three fatalities. The breaking of the gas-pipe was due to the subsidence of the sub-soil, which caused the pipe (long resident in the road) to sink, but to rest at one point upon a brick. It was at this point that the fracture occurred; but at the inquiry which was held into the fatalities, it was made quite clear that the main was originally well and truly laid. Immediately after this event, the question of carbon monoxide poisoning was again raised; and suggestions were made as to a further inquiry being held. But, probably in view of the relatively small number of accidents and fatalities which occur in connection with gas supply, no further action has been taken. As a matter of fact, it has been clearly shown on more than one occasion that the number of fatalities occasioned by gas, if we except suicides, is very modest relatively to other risks which the public run in connection with our daily services. As has been frequently seen, electricity is responsible for a considerable number of accidents and fatalities in the course of a year. However, a conference was held at the Board of Trade between local authorities and representatives of the gas industry, at which several recommendations were made, which may be summed-up by saying that they advocate the policy of a greater co-operation between local authorities and gas undertakings in respect of road work and the discovery and reporting of leakages of gas. The question has also been somewhat prominent as to whether or not gas undertakings should be granted the powers of prescription for internal piping, as well as of inspection. There are contrary views existing in the industry regarding this matter; but as safety is such an important factor in the interests of public utility concerns, the weight of opinion is certainly favourable to the course suggested. Again in this respect no action has yet been taken; but the Board of Trade have the matter well in mind. Towards the end of the year, there was a rather alarming explosion in Newington Causeway, which led the newspapers, in their ignorance, to refer to the matter as the "explosion" of a gas-main. As a matter of fact, it was proved that a subsidence had occurred in connection with the City and South London Tube Railway; and the removal of the support from the gas-main caused its fracture, and gas escaped into the cavity which had been formed. How that gas became ignited is a mystery, and appears likely to remain so.

DISTRIBUTION.

There have been several questions raised and discussed during the year regarding distribution. A Royal Commission has been appointed to consider the question of subsidences from mine workings; and this is a matter of considerable importance to the owners of gas-distribution systems in colliery areas. For gas-mains in such areas Mr. Walter Hole has directed attention to the value of rubber joints, and has recorded in an article in the "JOURNAL"

remarkable experiences as to the durability and satisfactory operation secured by their employment. Mr. Stephen Lacey, at the recent Public Works, Roads, and Transport Congress, read a paper on "The Position of Mains in Public Highways." In this he dealt with the modern methods of road construction in relation to the position that trunk and service mains should occupy. He also referred, among other matters, to the efforts that are being made by highway authorities to compel gas undertakings to bear the cost of altering the situation of their mains in the case of road diversions. This is totally unfair, and contrary to the statutory rights of such undertakings. The London County Council are taking the initiative in this matter; but the National Gas Council are, in the interests of the industry, determined to resist any infringement of the rights of gas-supply authorities. The question of the use of steel and cast-iron mains and wrought-iron and steel service-pipes is still a matter of controversy. Another polemical subject has been the part that hydrocyanic acid plays in connection with the corrosion of gas-mains and other metal structures. Mr. B. Richardson and Mr. H. E. Williams, at different times, expressed their opposition to Mr. J. G. Taplay's submission that hydrocyanic acid is the chief cause of corrosion. On the other hand, Dr. H. G. Colman holds that it is largely due to the presence of hydrocyanic acid in gas that corrosion is started; and Mr. B. R. Parkinson has referred to it as one of the chief "conspirators" in corrosion.

Organized Work.

All of our organizations have done excellently for the industry during the year. The National Gas Council have been never ceasing in their care of political and administrative interests; and the prospect is that there will be for long to come no lessening of the demands upon their energies. The Institution of Gas Engineers held a highly successful meeting at Belfast, under the presidency of Mr. J. D. Smith, M.Inst.C.E. Technically, commercially, and socially the meeting takes a front place in the annals of the Institution. Mr. S. Tagg is the new President; and since he ascended to the chair, there have been many calls upon his time, with which there has been cheerful and dutiful compliance. With the British Empire Exhibition next year, there is no question that he will find his tenancy of the Presidential Chair keeping him very fully engaged. The British Commercial Gas Association under the presidency of Alderman J. H. Lloyd, M.A., has had a very active year. Its district conferences, in which public health was particularly referred to, were highly successful; and the annual conference in Birmingham, towards the end of the National Gas Exhibition, was one of the best we have had the opportunity of reporting. The practical interest embodied in the proceedings, we think we may say without fear of contradiction, has never been surpassed on a similar occasion. In many other ways, the Chairman of the Executive Committee and all the officers of the Association have been very energetic; and as in the past, so in the future, we may rely upon the same valuable service being rendered to the industry. The new President of the Association is Mr. H. Wade Deacon, of Liverpool; and we may predict that his year of office will show the same brilliance of achievement on the part of the organization that we have had to record in the past. As Mr. Tagg, so Mr. Wade Deacon will find that he accepted this honourable position for a year which will, in view of the exhibition at Wembley, make big demands upon him. The Gas Companies' Protection Association has likewise rendered excellent work for the industry through the year, and particularly so its Chairman, Dr. Charles Carpenter, in connection with the therm charges inquiry. The co-operative work of the Society of British Gas Industries continues to be of marked value. The members have had an excellent year under the presidency first of Lord Riddell and now Lord Weir, who is to be followed in the chair by Mr. D. Milne Watson, the Governor of the Gas Light and Coke Company. Mr. F. C. Tilley has succeeded Mr. Albert Cliff as Chairman of the Council of the Society. The organization has just housed itself in commodious offices in Victoria Street, Westminster. The District Associations, the Junior Associations, and the Salesmen's Circles have all been pursuing their ways with good results for the commonweal of the industry.

Education in the Industry.

The promotion of higher and more systematic technical education in the gas industry is an essential. It has always been so; but never more than in the circumstances of the present, and having regard to the future. But it is one of those essentials that has from time to time been deferred to a more convenient season; and thus it is that, until this year, the matter has not been courageously taken in hand, and dealt with. The Institution of Gas Engineers appointed a Committee charged with the duty of evolving a scheme; and in collaboration with the Board of Education, one has been formulated, which has been endorsed by all competent judges as being (until experience may suggest amendment) the best possible under a somewhat complicated set of conditions. A conference of the Institution of Gas Engineers and of the "B.C.G.A." approved of it, as also of the outline of one submitted for training in the commercial side of the industry's work. The filling-in of the details of the latter is somewhat difficult; but the work will be brought to a conclusion as quickly as possible. However, the scheme for the training of technical men will do much to co-ordinate matters in this respect; and there will be value to the students in the certification which they will receive, and the diplomas they may gain, with the imprimatur of the Institution upon them. Mr. F. W. Goodenough presented the schemes to the conference previously referred to; and Mr. Walter Hole has been a willing protagonist all over the country. He has travelled and attended many meetings explaining the scheme, elucidating points upon which information was required; and he has frequently written on the subject. In short, he has left nothing undone that could be done to urge the importance of the scheme, to enlist the assistance of gas administrators, and to set the machinery moving. From this work we are looking for big results and influences upon the affairs of the industry.

We must not omit mention of the Department of Coal Gas and Fuel Industries at the Leeds University. Prof. Cobb's annual report showed advance in every direction, save in the number of students, which during the year slightly declined. But there were developments in the lines of study and research, as well as in the facilities for both. The long association of Prof. Arthur Smithells, F.R.S., with the University has come to an end, other than in honorary capacity, through his retirement. But he has left behind him imperishable work and a big place in the affections of all with and for whom he laboured. A fund has been formed to put on record the appreciation of his inestimable services—not in personal form, but in a manner which meets with his approval. His portrait is to be painted; and there is to be established in his name and upon his advice a fellowship or scholarship. In connection with the Department of Chemical Technology at the Imperial College of Science and Technology, the Gas Light and Coke Company have provided the funds for a post-graduate research fellowship.

Passed Hence.

From various places in the industry, there have passed into the great beyond men who have taken their good part in our activities—men we have known as friends; men we have held in high regard and honoured. We call to mind as we write Mr. James W. Helps, Mr. G. Thornton Andrews, Mr. J. G. Hawkins, Mr. G. F. L. Foulger, Mr. William Chew, Mr. George Winstanley, Mr. Samuel Cutler, Mr. James Hutton, Mr. Joseph Davis, Mr. William Cheshire, Mr. W. H. Y. Webber, and Mr. R. B. Chalmers. There were many others—some of them bearing well-known names in the plant and appliance manufacturing section of the industry. Their memories will live with their contemporaries.

To the Future.

We have omitted reference to many matters in this superficial glance backward. There is a plethora of work and doings in the industry to-day; and to touch upon it all defies the space at disposal. However, our work is to move onwards, and build upon that which has passed. This is being done. The rate of our movement and the achievement of successes depend not only upon ourselves, but the circumstances of the times. Looking forward, we are met with the uncertainty of the political situation. But assuming no great difficulties arise, we look with a large amount of confidence to the advance of the gas industry in prosperity. It is using its power with great effect to-day. There has been an awakening; and the trend is to higher standards

of efficiency in work. Those whose policy is of the stagnant order will find that the influences which assail them will become the more potent because of their foolishness. But, speaking generally, we feel cheerful as we contemplate the prospects of the industry; and nothing affects the warmth and sincerity of our wish that all our readers may have—

A HAPPY CHRISTMAS, AND HEALTH AND PROSPERITY IN THE COMING YEAR.

Lower Prices for Gas Coal Contracts.

According to a report that has appeared in the "Yorkshire Post," there were some condemnatory things said, at a meeting of the West Yorkshire Gas Coalowners' Association, about gas undertakings which have already entered into contracts at reduced prices for the twelve months ending June, 1925; and equally unkind criticism was made of the colliery owners who had enabled this to be done. There was "amazement" that any responsible colliery company should, having regard to the present unsettled state of affairs, have committed themselves so far forward, and at lower prices than those now prevailing. But there was consolation in the minds of the critics that the tonnage represented is relatively small. The apparently reprehensible movement is based on the belief that, the Ruhr miners having agreed to resume work, and for longer hours per day, the output will, within a reasonable time, be equivalent to, if not greater than, pre war. It is thought that this will have the effect of throwing on to the home market some of the coal now exported. The Gas Coal Association regard these as flimsy and uncertain grounds for colliery owners or factors to enter into new gas contracts at less than current prices. It is also considered that the policy of committal for eighteen months ahead is indefensible, and that, if there is an industry in the country which can afford to pay a "reasonable" price for coal, it is the gas industry. Mistakes are sometimes made. In any circumstances, why the gas industry should pay more than other people for the same qualities of coal is not explained.

Increased Price Recommended.

Following this, resolutions were passed. The first one deprecated the action of collieries or factors in being parties to the "foolish" policy referred to. Then came another, which placed on record the solemn opinion that, in view of the political situation, and the increased demand of the miners for a greater share in the proceeds of the industry, and of the "excellent" financial results obtained by the gas industry generally, very long contracts should not be entered into, and that present prices should, as regards renewal of contracts, be increased (as the minimum) to the extent to which additional costs of production are brought about by reason of any new wages agreement which may be made between the coalowners and the mine workers. It is plain that the West Yorkshire Gas Coalowners' Association are highly incensed over the action that has been taken. They do not know that any new agreement entered into by the miners will increase the costs of production; they are not even aware that the present national wages agreement will be cancelled. Notwithstanding, it is clear they have their minds fixed upon an increase on present contract prices. They are not content even to contemplate renewals at existing prices, and so set-off the effects of the Ruhr situation against any likely advance in the earning position of the miners. Perhaps after all those who have made it worth while gas undertakings entering into contract renewals so far ahead may find that they have done a wise thing. Gas undertakings who can do so had better steer clear, in making new contracts, of the discontented members of the West Yorkshire Gas Coalowners' Association.

The "Home Circle."

A "Home Circle" formed by the Greenock Corporation Gas Department is proving a great success. Its members are taking full advantage of the facilities placed at their disposal by the Manager (Mr. George Keillor). One hour per week is at present devoted to discussing the various problems which arise during the week. Each member states anything of interest which may have occurred in his own particular sphere, and any knotty points are then threshed out in open discussion. The meetings take place each Thursday afternoon, and are quite informal; smoking is permitted, and tea is provided by the department. The members consist of foremen, inspectors, showroom and office staffs, and the Superintendent presides. It has now been decided to hold semi-social meetings once a fortnight, at which the outdoor and indoor fittings staffs will be encouraged to attend, when lantern lectures will be introduced and short papers read. This is an excellent movement.

Gas Coal Shipments.

The quantity of coal of all descriptions shipped during November was 6,669,903 tons. This was very little in excess of the quantity exported in the same month of 1922—viz., 6,570,758 tons. In November, 1921, the amount sent abroad was 3,593,864 tons. During last month, there was a considerable fall, compared with November last year, in the amount of gas coal exported. The quantity was 683,791 tons, compared with 902,028 tons. The value of the gas coal shipped last month was £825,959, as against £994,980 in November, 1922. The price per ton last month averaged a fraction of a penny under £1 4s. 2d. During the eleven months of the year, the total exports of coal have reached 73,575,713 tons, of which 8,479,743 tons represent gas coal, and this quantity is credited with a value of £10,297,099.

Gas Coke Exports.

In November, the amount of gas coke exported was 133,170 tons, having a value of £232,189, or an average of £1 14s. 1·4d per ton. In the corresponding month of 1922, the exports amounted to 115,680 tons, with a value attached of £159,023. In the eleven months of the year, 1,114,885 tons of gas coke have been sent abroad, having a value of £1,801,504. In the same period of 1922, 816,322 tons were shipped, carrying a value of £1,154,009.

Increased Sulphate of Ammonia Exports.

The quantity of sulphate of ammonia shipped during November was 19,005 tons, compared with 14,058 tons in November, 1922. The amount sent overseas during the eleven months of the year was 230,598 tons, compared with 127,338 tons in the same period of 1922

Resonance Method of Gas Analysis.

There is an illustrated description, by Mr. Rudolph Geberth, of Brooklyn, in the December issue of "Industrial and Engineering Chemistry," of an apparatus designed by Mr. Samuel Ruben, a physicist of New York, and based upon principles of resonance, to overcome objections to chemical methods of making quantitative determinations of gases. By the aid of this device, he states that determinations as to binary gases are made with great accuracy and speed. Broadly, the apparatus involves the principle that mechanical energy impulses, such as sound waves, produced by a vibrating element, differ in character with the condition of the gas through which they are transmitted. By "condition" is meant either a physical property, as density, or its chemical composition. The apparatus consists of a closed cylinder, adjustable as to length, through which the gases are passed, and having at one end a diaphragm coupled to a tuning fork, electrically maintained, together with a current-measuring instrument. One of the cylinders is closely movable within the other by means of a rack-and-gear arrangement, and has a graduated dial attached to the gear shaft for indicating gas column length. A thermometer projects into the chamber for temperature corrections. In action, the tuning fork is oscillated at a constant rate by an electro-magnet having a carbon transmitter as a variable resistance. As the column is brought close to the resonance point, the ammeter, in series with the electro-magnet, indicates a very sharp current rise. The input current of the driving element depends upon the amplitude of the fork vibration as controlled by the diaphragm; its force of reaction against the fork varying according to the condition of the gas in respect to its resonance length. When the column is in resonance with the sound wave length, the load upon the fork is at a maximum, and this is sharply indicated by the ammeter. The dial reading, then, which is in accord with that of the ammeter, furnishes the resonance length of the gas column. The resonance length of a known gas is indicated by the relation between the velocity and the frequency of sound through that gas. The instrument has no delicate parts, and there is little or no wear or deterioration.

Another Gas-Works Rating Reduction.—Early in the year, Mr. Arthur Valon was asked by the Newton Gas and Coke Company to look into the question of their assessments, which had been raised from £1541 to £1797. On going into the matter and interviewing the Assessment Committee thereon, so good a case for a reduction was made out that the Committee were induced to agree to a figure of £1400, or £141 less than the old assessment.

PERSONAL.

An interesting presentation took place at the Council Offices, Clacton-on-Sea, last Wednesday, when two armchairs and a Chesterfield, the gift of fellow officials, were given to Mr. E. GORDON WEBB, Distribution Superintendent of the Gas and Water Department. These were presented by Mr. G. T. Lewis (Clerk to the Council), on behalf of the officials, as a mark of esteem and respect on the occasion of Mr. Webb's recent marriage. Mr. Lewis wished Mr. Webb every happiness, and his remarks were supplemented by Mr. S. Francis (Engineer and Manager of the Gas and Water Department). Mr. Webb suitably responded, thanking all for their kindness and good wishes.

OBITUARY.

Prof. FRANK CLOWES, D.Sc., F.I.C., F.C.S., whose death at the age of 75 we regret we have to announce, was during his working life well known to readers of the "JOURNAL." Born near Bradford in 1848, he was educated at the City of London School, the Royal College of Chemistry and School of Mines, London, the Royal College of Science, Dublin, and the University of Würzburg. Original papers were communicated by him to many bodies, including the Gas Institute, and articles of his appeared in publications devoted to the subjects he had made his own. In the session 1892-3 he was invited by the Society of Arts to lecture on the "Detection and Estimation of Combustible Gas and Vapour in the Air;" and in the following year he delivered before that Society a series of Cantor Lectures. In 1896 he lectured on this topic, with much ability, before the Gas Institute. Subsequently he wrote a text-book on the same subject, and was also responsible for other works on chemical analysis. He also gave evidence on a number of Gas Bills. Prof. Clowes retired, under the age limit, at the beginning of 1913 from the position of Chemist and Superintending Gas Examiner to the London County Council, which appointment he had held since 1897, when he succeeded Mr. W. J. Dibdin. Previously, from 1881, he had been Professor of Chemistry at the University of Nottingham. He was the first Principal of the College, and after his retirement was given the title of Emeritus Professor. Since 1913 he had been expert adviser in gas supply to the Corporation of London. As an active member, various societies derived advantage from his great chemical knowledge. He was a Past-President of the Society of Chemical Industry, an original Fellow and twice Vice-President of the Institute of Chemistry, a Fellow of the Chemical Society, and twice Vice-President of the Chemical Section of the British Association for the Advancement of Science.

The death occurred on the 18th inst., in his 90th year, of Sir HENRY KIMBER, Bart., following a fall at his home in Putney, when he unhappily broke his arm. He was widely known in political circles, having for many years, up to 1913, represented Wandsworth in Parliament as a Unionist. "JOURNAL" readers will particularly remember him as President of the Gas Companies' Protection Association, which position he resigned about 1912, being succeeded by Sir J. Fortescue Flannery, Bart., who on his election referred to the enormous influence that Sir Henry had in the House of Commons, and to the loss the Association had sustained by his resignation. Deceased was a Solicitor, and was connected with many prominent commercial undertakings.

ELECTRICITY SUPPLY MEMORANDA.

It was a particularly interesting and opportune paper that the members of the Institution of Engineers-in-Charge recently had before them from Mr. George Evetts, M.Inst.C.E., and which was given in abstract form in the "JOURNAL" last week. The author told them a great deal about the progress in the manufacture of gas, of the higher efficiencies now obtained, and so forth. But a popular feature of the paper was the allusion to the question of the cost of utilization of gas in comparison with other fuels; and this extracted from some of those present valuable information as to experiences. The author gave a table which presented the cost per therm of different fuels. Among them stood electricity, showing that a therm will, at 2d. per unit, cost no less than 58·2d., as compared with (say) 8d., 9d., or 10d. for a therm supplied as gas. But Mr. Evetts was fair. He pointed to the variations of efficiency in use. For instance, with gas costing 10d. per therm, the efficiency for heating a room being (say) 72 p.ct., to get a therm of heat into the room would cost 14d.; while with electricity, with an efficiency of nearly 100 p.ct., to get a therm of heat into the room, would cost about 59d. Electricians may wriggle as much as they like, but they cannot divest themselves of facts of this kind. All they can do is to express doubt as to the efficiency of the gas-fire. But we have never yet succeeded in getting an electrician to take part in heating tests—to determine the radiant heating efficiency of a gas-fire, and the temperature of the flue gases; then adding to the radiant heat the difference between these two factors and the B.Th.U. supplied to the fire—the difference being convected heat—and so ascertaining the total efficiency. It is really too much to expect them to prove the groundlessness of their expressed doubts.

Heating Experiences.

Practical Testimony.

It will interest electricians to read some of the practical testimony in the discussion as to the value of gas and coke—particularly that of Mr. T. Cooper, M.A., the Engineer-in-Chief to the Metropolitan Asylums Board. He referred to the gigantic strides gas had been making in the two fields of heating and cooking; and he described the gas-stove as one of the most highly scientific things to be found in the household. But in the big kitchens of the Asylums Board, it is found that coke-fired brick ovens are the most economical for cooking on a large scale. Messrs. Lyons prefer gas. Here, however, are two large users, both favourable to one or other of the fuel products of gas-works. Mr. Cooper also gave some information as to the use of gas for laundry work—likewise on the large scale; the details will be found on p. 777 of last week's "JOURNAL." The Board have six large laundries, in each of which there are washed weekly approximately 25,000 articles. In all, 37 gas-irons are used, two collar machines and skirt ironers, &c.; and the consumption of gas is very modest, as will be seen by the data supplied. The result Mr. Cooper regards as very satisfactory; the output per worker being increased enormously by the use of the irons. As to gas-ovens in large institutions, Mr. Pickles, of the West Ham Infirmary, gave some excellent information. In his case, for twenty-four cooking-ranges, 12 tons of coal a week were used, which for thirteen weeks equals 156 tons. At £2 17s. 6d. a ton, the total cost was £448 10s. For 24 gas-cookers, for thirteen weeks, the consumption was 594,000 c.ft., which at 4s. 8d. per 1000 c.ft. equals £138 12s.—an actual saving of £309 18s., or upwards of 68 p.ct. Mr. Pickles says there is no doubt about this test. To-day the consumption of gas is even a little less; and, we may add, so is the price. This experience shows that there are other factors, besides the cost of the potential energy supplied, which contribute to economy in the use of gas as compared with coal. Electricity would have something to do to compete with this work and the expenditure for it.

Electric Radiators Cause Embarrassment.

Some electricity undertakings with a fairly good connection of electric fires have found them a positive inconvenience, through their short-time use, and the fact that they are required simultaneously and at the worst period of demand. Moreover, the price per unit has to be low to encourage use. The Ilford Council have found the electric radiators fixed in their district, representing in new connections since October 140 KW., are causing them some embarrassment; and the Electricity Committee have therefore decided not to accept at present any further applications for new radiator connections. The plant will have to be increased before this can be safely done. Other electrical engineers have discovered this; and they have asked themselves whether, for such a demand, the business is worth having.

The Escapades of Electricity.

The escapades of electricity have become notorious. They take many forms. We have read of several failures recently. Among them one occurred at Poplar, last Monday week, when Christmas shopping was in full swing. It was a sudden collapse, unkindly timed. Shopkeepers in their distress turned to primitive candles and oil lamps—the friends in need of the modern vagarious illuminant. True, the failure lasted only twenty minutes; but long enough to be highly disconcerting to those who have to put their trust in electricity for illuminating purposes. Even at the hospital, the staff had to carry-on as best they could by the aid of candles; and so did the Post Office. Another form of trouble was experienced the following evening at Acton, when, owing to a mishap on an electric cable, gas was formed, an explosion took place, causing an upheaval of the pavement, and blowing three women into the roadway. Not only had these women the surprise of their lives, but one of them was rather badly hurt; the others escaped with shock and scorched clothing. Portable electric lamps are getting a bad name for causing fatalities. News of another comes from Halifax. The victim was Henry Booth, who was engaged at a dye-works. At the inquest, it was found that death was due to electric shock, caused by a defect in the connecting wire of a hand lamp. Mr. Brown, one of the Electrical Inspectors of Factories, stated that the insulation was missing from one of the connections. The owners of the factory a short time ago adopted the Corporation service for lighting; and, in Mr. Brown's opinion, alternating current is more dangerous than direct.

Crudeness of Overhead Wires.

Overhead wires for electricity supply are not liked by the people. We saw opposition recently when it was proposed to disfigure an old-world rural village with them. The inhabitants do not want them; and they asked the powers that be not to sanction them. There has been a protest in a Sheffield paper by a correspondent against a proposal of the Electricity Committee to extend their overhead wires to the Manor Housing Estate. The people have seen these wires in

Abbey Lane, Richmond Lane, Handsworth, and Wincobank; and they do not like the look of them. The correspondent who made the protest calls it "vandalism;" and the Corporation Housing Committee have refused to sanction the "antiquated and out-of-date system." It is also described as amateurish work. Who can be surprised? Whatever is said in condemnation is not undeserved. The correspondent signs himself "A Dissatisfied Ratepayer;" and he concludes his letter by saying: "If the Electricity Committee cannot do better for the beautiful suburbs and environment of Sheffield than their proposal for overhead wires—well, let them get out, and let us have a new Electricity Committee more in sympathy with the public requirements and care of the beautiful." In this matter public opinion must be considered as well as the desire of electricity departments for extending their service in a crude fashion for the sake of cheapness. Upon the Manor Estate, some 2½ millions of money, it appears, are being spent, and the Estates Committee resent the proposal of the Electricity Committee to disfigure the estate with overhead wires. At the meeting of the City Council at which the matter was discussed, there were charges against the Committee that their estimates for subterranean services were unnecessarily inflated by the inclusion of items which would apply in any case, whether overhead or underground wires were used for distribution. But this by the way. The Estates Committee were firm against overhead distribution; and they were supported in their attitude by the Council.

Danger of Overhead Wires.

There was a case recently at the Manchester Assizes in which Mr. John Redhead, a farmer, sought damages from the Rawtenstall Corporation for the loss of his daughter, whose death was caused by the descent of a live wire into the roadway after a heavy fall of snow in December last year. The overhead system was used for conveying electrical energy to houses. It was alleged that the wires had been installed in a negligent manner. When they fell, the girl was passing along the road, and received a shock, which resulted in her death on the spot. The damages were assessed at £500, with costs.

CHEMICAL TOPICS FROM CURRENT LITERATURE.

Notes from Recent Technical Publications.

By H. J. HAILSTONE (Rochdale).

FUEL RESEARCH.

The work of the Fuel Research Board is so well known to the gas industry that most readers will have studied many of the reports and technical papers which the Board have issued. All who have charge of bulk coal testing and purchase should be acquainted with the methods of coal analysis and examination elaborated by the Board. With regard to carbonization practice, the questions of steaming in vertical retorts, of low-temperature carbonization, and of water-gas manufacture, have already had attention, and further work is proceeding. A broad survey of the activities of the Board and of some of the problems that have been investigated is given by Dr. Lander in "Chemistry and Industry," and this indicates a wide range of activity.

SPECIFIC HEAT OF COAL.

A paper by G. Coles, read before the Birmingham Section of the Society of Chemical Industry, has appeared in the "Transactions" of the Society. A suitable method for determining the specific heat of coals was adopted after trials of several methods; and this is described, and concordant results are claimed for it. The figures obtained indicate that the specific heat of any coal depends upon the moisture and ash contents, and in comparing results the values to be allowed for these are: Moisture 1·0 sp. ht.; ash 0·16 sp. ht. With regard to the dry ash-free coal substance the value varies from 0·22 to 0·25 according to the ratio of the carbon to the hydrogen. A coal high in volatile matter—*i.e.*, having a low C:H ratio—possesses a low specific heat, and *vice versa*. The figures given will enable the specific heat of any coal to be worked out direct from ordinary analytical data.

RETORT CARBON.

In the "Berichte," K. A. Hoffmann and C. Röchling describe a vitreous form of carbon which possesses remarkable elasticity and electrical resistance This opaque substance, which is practically pure carbon, may be formed upon the smooth surface of a hot body (heated to at least 650° C.) by the flame of mixtures of hydrogen and certain hydrocarbons. Its formation, therefore, resembles that of retort carbon; and it is suggested that the hardness of the latter is due to the cementing properties of this lustrous form of the element, which binds together the particles of amorphous carbon into the hard mass such as is recovered from retorts.

SILICA GEL.

The reference in the last "Notes" to the use of silica gel in benzole recovery practice [*vide* "JOURNAL" for Oct. 24, p. 249] is recalled by a notice in "The Chemical Age" to the effect that the American Silica Gel Corporation intend to establish an English company to develop the use of a new silica gel process in benzole recovery, oil refining, and air drying. Meantime, further correspondence in the columns of "Chemistry and Industry" makes comparison between the merits of silica and activated charcoal. It is pointed out that the properties of these materials are somewhat opposed; the latter having a selectivity for hydrocarbons, and the former for water. Hence the use of silica gel may necessitate partial dehydration of the gases prior to treatment for benzole absorption, though this point seems a debatable one. However, further details and particulars of practical results will in due course become available.

ABSORPTION PIPETTES FOR GAS ANALYSIS.

Two new types of pipette have recently been designed with the particular object of ensuring good contact between the reagent and the gas under test. One of these, devised by Mr. Staniar, of Stockport, and put on the market by Messrs. Townson and Mercer, consists of two bulbs united by a U-tube at the base. The inlet tube, which terminates in a jet inside the bulb, has a branch syphon tube communicating with the top of the bulb. With this pipette, which is charged with reagent, the use of a three-way tap is avoided, and thorough washing of the gas is secured, thus rendering possible very complete absorption and speedy work—a feature of particular importance in carbon-monoxide estimations. Another pipette, described by S. W. Saunders in the "Transactions" of the Chemical Society, consists of two absorption bulbs and an adjustable reservoir. A constricted capillary tube connects the base of the higher bulb with the top of the lower, and an additional connecting tube of wider bore leads from the top of the lower bulb to a jet in the interior of the one above. Mercury is used as the confining medium; and when absorbing various constituents, the gas sample is "sprayed" with the desired reagent by correct manipulation of the reservoir.

SEPARATION OF GASES.

A diffusion process for separating various gases, such as carbon dioxide and hydrogen, &c., has been investigated by F. Fischer, H. Schrader, and A. Jaeger; an account of the work appearing in "Brennstoff-Chemie." The gas of lowest specific gravity, diffusing through a porous diaphragm, was carried away by a current of steam, and collected. By suitable modification of temperatures, pressures, and steam velocities, it was found possible to obtain some separation of the constituents. In further developments the porous diaphragm was dispensed with, and replaced by a layer of Raschig rings. After two treatments in this apparatus a small proportion of hydrogen of 95 p.ct. purity was obtained from coal gas and from water gas. Hydrogen of 70 p.ct. purity could be obtained from town gas in one diffusion process.

SOLUBILITY OF NAPHTHAS IN WATER.

The work of F. Fischer regarding the extraction of phenols from tar oils by solution under pressure in superheated water [reference was made to this in the "JOURNAL" for Oct. 24, p. 249] is somewhat similar to a series of experiments described in "Brennstoff-Chemie" by A. Jaeger, who has investigated the solubility of coal-tar hydrocarbons in water. A temperature range of 100° to 300° C. was employed at corresponding pressures. It was found that the more volatile hydrocarbons were more soluble than those of higher boiling point; and in the case of benzole and toluole 13 to 14 p.ct. could be taken up by water under pressure at 300° C. Figures obtained indicated also that aromatic hydrocarbons were more soluble than aliphatic compounds. Considering the notable advances in researches on high-pressure reactions and conditions that have been made during the last few years, it is evident that there is a very wide field for further work along the lines indicated in these investigations.

SULPHATE PLANT CONTROL.

A small instrument has come to hand from the Chemical Engineering and Wilton's Patent Furnace Company, Ltd., of No. 76, Victoria Street, S.W. 1, which will be a welcome aid in the control of sulphate plants. By its use it is possible to ascertain immediately the volume of liquor and the weight of lime required for the production of one ton of sulphate. All qualities of liquor likely to be met with in gas and coke-oven works practice appear to be provided for, as the range extends from 4½ to 16 ozs. strength total ammonia, with a fixed ammonia content from 0·6 to 6·0 ozs. Such information is vital in checking the efficiency of a plant, and it should be the practice of all in charge to compare their actual working results with those indicated by the instrument referred to. That the need for such control is still very great is borne out by the remarks made on the subject by Dr. T. L. Bailey, Chief Alkali Works Inspector, in his last report; particular attention being drawn to the need for regular analysis of the liquor used, and the adjustment of the lime supply. Messrs. Wilton's instrument, which should be in the hands of all sulphate plant managers and foremen, clearly indicates the results which are to be obtained in good practice.

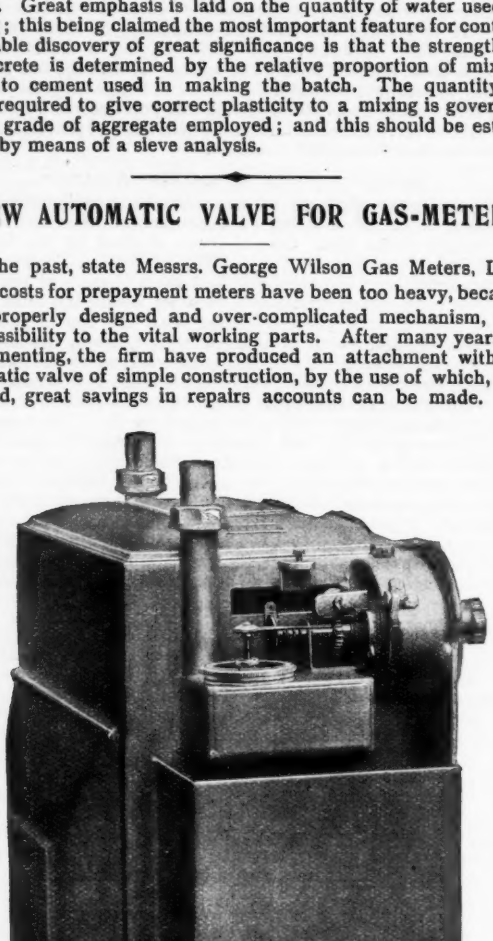
CONCRETE.

Under the title "Scientific Methods of Making Concrete," Prof. D. A. Abrams, in "Chemistry and Industry," gives an illuminating report of research work carried out at the Lewis Institute, Chicago. For some years investigations have been proceeding with a view to extending knowledge of the subject of concrete, in particular its mixing and strength. As the factors determining the strength of concrete appear to determine equally such factors as resistance to wear, weather, and attack by chemical agents,

the information briefly summarized by Prof. Abrams will repay the study of those concerned with concrete work in the gas industry. Great emphasis is laid on the quantity of water used in mixing; this being claimed the most important feature for control. A notable discovery of great significance is that the strength of a concrete is determined by the relative proportion of mixing water to cement used in making the batch. The quantity of water required to give correct plasticity to a mixing is governed by the grade of aggregate employed; and this should be established by means of a sieve analysis.

A NEW AUTOMATIC VALVE FOR GAS-METERS.

In the past, state Messrs. George Wilson Gas Meters, Ltd., repair costs for prepayment meters have been too heavy, because of improperly designed and over-complicated mechanism, and inaccessibility to the vital working parts. After many years of experimenting, the firm have produced an attachment with an automatic valve of simple construction, by the use of which, it is claimed, great savings in repairs accounts can be made. All



The Complete Attachment and Automatic Valve in Position.

working parts of this new attachment, which is shown in the accompanying illustration, are brought outside the meter, to enable repairs to be effected *in situ*. The attachment, which is composed of few parts, cannot be jammed by over-prepayment. The "Auto" valve can be taken out *en bloc* for cleaning or re-seating without the aid of a screwdriver or soldering iron. These improvements have been effected without upsetting the important features of a quick-opening valve and a full and direct gasway.

Low-Temperature Carbonization.—In a lecture at Sheffield last week, before the Yorkshire Association of the Institution of Civil Engineers, Prof. H. E. Armstrong, F.R.S., said that in discussing the problems of low-temperature carbonization they were considering the efficient use and conservation of the country's fuel supplies, which was one of the two major issues before the nation. Sheffield was a bad example of the improper use of coal. The production of a solid smokeless fuel was of such enormous national importance that it could not be left much longer in the hands of individuals.

London Fogs and the Death Rate.—The last weekly return of births and deaths issued by the Registrar-General contains the following statement: During the weeks ended Dec. 1 and 8 fog was more or less prevalent in the Metropolis, and, as is invariably the case, there was a marked increase in the death-rate. Respiratory diseases showed very substantial increases, and this was particularly the case with deaths from bronchitis and broncho-pneumonia, where the atmospheric conditions would be most directly detrimental. The deaths from these two causes from the week ended Nov. 17 onwards were 106, 138, 251, and 303 respectively.

REMOVING ORGANIC SULPHUR FROM GAS.

A Description of Processes.

By Dr. A. R. POWELL, of the Koppers Company, Pittsburgh.

[**Extracted from the Report of the American Gas Association 1923 Committee on Purification.**]

Various processes have been designed for the partial removal of organic sulphur from gas. No method has yet been devised which will completely remove organic sulphur, and it is very doubtful whether such stringency is necessary, since part removal will decrease a high fixed-sulphur content to within the legal limit. The methods used for the removal of organic sulphur may be classed in four groups: (1) Hot purification, of which there are several different processes; (2) washing by oil; (3) alkalinated cellulose; and (4) charcoal or other absorbent material.

HOT PURIFICATION.

Hot purification is generally dependent on the reaction:

$$CS_2 + 2H_2 = 2H_2S + C.$$

It can readily be seen that this reaction is the exact reverse of that which leads to the formation of carbon disulphide. The conditions must, therefore, be carefully regulated, in order to obtain the maximum conversion of carbon disulphide into hydrogen sulphide. In general, the temperature must be high enough to cause the conversion to take place at a reasonable rate, and yet not high enough to cause the reaction to reverse.

The hot purification of gas on a commercial scale was first carried out at Portland, Oregon. The apparatus consisted of two vessels constructed much like water-gas carburettors. While the checker brick in one vessel was being heated by producer gas to bring it to the necessary temperature, the other vessel, already hot, was purifying the gas passing through it. The hydrogen sulphide formed was removed by iron oxide. By using a temperature of 1200° Fahr. about 70 p.ct. of the organic sulphur could be removed. The total cost of the process at that time was about one cent per 1000 c.ft. of gas. This process was designed primarily for oil-gas purification; but it was intended that the same principle could be applied to coal gas or water gas. Mr. E. L. Hall, General Superintendent of the Portland Gas and Coke Company, later took out a patent for an apparatus for the conversion of organic sulphur into hydrogen sulphide by means of a silent electric discharge, which was intended to supplant the hot purification. This was abandoned, however, and at the present time the Company are changing over to an oil-washing process. The advantages claimed for this will be stated later.

The hot purification process just described depends solely on the effect of temperature to secure conversion of the carbon disulphide into hydrogen sulphide. Several other processes have been devised which make use of catalytic material to promote this conversion, and are thereby enabled to operate at lower temperatures. One of the best known of these is the Carpenter-Evans process. The gas to be treated is heated to about 800° Fahr., and is then passed over fireclay balls impregnated with nickel. The nickel catalyzes the conversion of carbon disulphide into hydrogen sulphide, thus allowing a much lower working temperature. The catalyst soon becomes coated with carbon, so that it is necessary to burn this out at certain intervals. The percentage of organic sulphur which can be removed by this process is said to be in the neighbourhood of 70 to 80 p.ct. The latest cost figures from England indicate that the cost of purification by the Carpenter-Evans system is about 1½ cents per 1000 c.ft.

Another method, somewhat similar to that of Carpenter and Evans, is the Rideal-Taylor process. In this, however, hydrogen is not used to secure the decomposition, but steam is introduced with the gas to cause the decomposition of carbon disulphide according to the reaction

$$CS_2 + 2H_2O = 2H_2S + CO_2$$

This is a decided advantage over the Carpenter-Evans process in that no carbon is deposited which must later be burned out. Furthermore, the catalyst is somewhat cheaper since it consists simply of iron oxide mixed with a small amount of chromium oxide. However, no practical plant cost figures are available.

Several years ago, W. H. Fulweiler described a hot purification system used at Harrisburg. The catalyst in this case was a very active iron oxide, and the temperature used was about 450° Fahr. The gas was preheated to this temperature after the hydrogen sulphide had been removed, and before passing through the catalyzing material. Gas containing about 40 grains of fixed sulphur had this content reduced to 9 grains. No cost figures are available.

WASHING BY OIL.

Within recent years a system has been successfully inaugurated at Halifax for decreasing the organic sulphur in gas. The process depends on the fact that 50 p.ct. or more of the organic sulphur may be removed from the gas by washing with paraffin oil. The oil may then be put in condition for further use by distilling out the dissolved carbon disulphide with steam. The apparatus consists of a series of three steel towers filled with wooden grids. Fresh oil enters the last tower of the series, and flows from this to the other two towers successively. The fouled oil from the first tower of the series is steam distilled in a tar still at a low temperature, to remove the carbon disulphide. Mr.

Hamilton has furnished the Committee with the following comments on the process, based on recent experience.

Our experience has shown that the oil temperature should not be under 50° or over 60° Fahr., and that, so far as possible, the temperature of the oil should be maintained 1° or 2° below that of the gas with which it comes in contact. This has been accomplished by installing cooling coils between each of the three towers. The best reduction in sulphur for the least amount of oil appears to take place when from eight to ten gallons of oil per 1000 c.ft. of gas are used. We have also found that the method of handling the oil during its redistillation has considerable effect on its absorptive capacity. Our experience has led us to believe that it is best not to attempt to strip all the benzole from the oil during the redistillation process. It is now being operated in such a way that about 50 p.ct. of the total benzole content of the oil is removed at each distillation. With this benzole is driven off the major portion of the carbon disulphide. These points cover experience extending over three years of practically continuous operation with this system of purification. With twenty-four hour working, and careful temperature control, it is possible to make reduction to approximately 50 p.ct. of the organic sulphur present in the gas.

The Portland Gas and Coke Company have recently established a new process of oil-gas manufacture, in which the production of light oil is a prime consideration. Under these conditions they have found it profitable to establish an oil-washing process for the double purpose of removing the light oil as well as the carbon disulphide. This is replacing the hot purification process originally used at Portland for the removal of organic sulphur. Mr. E. L. Hall has the following to say regarding the advantage of this method:

The removal of organic sulphur by this means is so closely associated with the methods for, and benefits derived from, the recovery of light oil, that it is practically inadvisable to undertake one without the other. A great many plants formerly producing light oil have not considered it profitable to do so under post-war conditions; but I am convinced that the future will bring back a revival of this phase of bye-product recovery, principally on account of the associated benefits, which I may enumerate as follows:

1. Removal of benzole for sale as motor fuel or otherwise—an operation which is more or less self-sustained, and the profits of which are essential towards defraying the cost of oil washing with a suitable oil, which has necessarily to be steam distilled.
2. The removal of naphthalene, which is accomplished at no extra expense.
3. The removal of 75 p.ct. of the organic sulphur, which from present indications is entirely feasible.
4. The elimination from the gas of certain hydrocarbons causing a gummy deposition on the meter valves.

All these advantages, if properly weighed, should bring about benefits sufficient to favour benzole recovery; and it is my conviction that the organic sulphur will eventually be handled by this means, rather than by any other with which I am acquainted.

Alkalinated Cellulose.

The use of alkalinated cellulose for the removal of carbon disulphide from gas is often referred to as the "Athion" process. The alkalinated cellulose is made by treating cellulose sulphite with soda lye This material is spread on purifier grids, and the gas, free from hydrogen sulphide and carbon dioxide, is passed through it. Removal of the carbon dioxide from the gas is effected by passing the gas through potassium carbonate before it goes through the alkalinated cellulose. The fouled material is essentially viscose, which finds use in the manufacture of artificial silk, celluloid, &c. The inventors claim that alkalinated cellulose will cause a reduction in organic sulphur compounds of 75 p.ct., and that ten tons of the material will absorb 1¼ tons of carbon disulphide. It is improbable that this process will find use in this country. The necessity for removal of the carbon dioxide is a big factor, and would probably make the cost prohibitive, without any further charges. The purifying material itself would be expensive, and it is very doubtful whether the quality of the bye-product (viscose) would be high enough to offset any of the costs.

Charcoal.

Charcoal will absorb approximately 65 volumes of sulphur compounds from gas, whereas the volume of other gas constituents absorbed is much smaller. Gordon Adams has patented a process based on this fact. After the gas has passed the boxes it goes through animal or wood charcoal in a granulated form. The quantity of charcoal used must be just sufficient to be saturated with sulphur compounds and naphthalene—not too large a quantity, since this leads to excessive loss of unsaturated hydrocarbons. This will vary to a considerable extent; but 70 lbs. of charcoal per ton of coal carbonized has been taken as a figure representative of coal gas. The charcoal is regenerated for further use by heating to about 300° C. No practical operating tests of the absorbent method for removing carbon disulphide from gas have been carried out in this country.

Two New Books on Fuel.—We have received copies of two new and interesting publications by Messrs. Ernest Benn, Ltd., dealing with the subject of fuel utilization. One is entitled "Pulverised and Colloidal Fuel," and is written by J. T. Dunn, D.Sc., F.I.C.; the other—"The Utilization of Low-grade and Waste Fuel"—is written by W. Francis Goodrich, who is the author of several books dealing with pulverized fuel and power production from refuse. These two volumes will shortly be reviewed in our columns.

NAPHTHALENE: ITS DEPOSITION FROM COAL GAS.

By W. I. Ineson, of Bradford.

[A Paper read before the Yorkshire Junior Gas Association, Dec. 15.]

Until the advent of high retort temperatures, the gas industry was not cognizant of the existence of naphthalene, except as a constituent of coal tar. The attainment of increased volumetric yields has given to the industry a legacy of problems of manufacture and supply, not the least of which is that of naphthalene, in so far as it affects the satisfactory supply of gas at an adequate and dependable pressure.

The great bulk of the naphthalene produced by the carbonization of coal is found in the middle-oil fraction of coal tar, from which it is crystallized, subsequently being purified by strong sulphuric acid, which forms soluble sulphonic acids with the impurities; the residual naphthalene being re-sublimed or distilled in steam. The naphthalene thus produced crystallizes in plates, which melt at 79° C. and boil at 218° C., and is extremely volatile, considering its high molecular weight, even far below its boiling point.

Although to the gas industry naphthalene is synonymous with annoyance, the bulk of the naphthalene produced by it is a fairly valuable product, being used as the base for synthetic indigo and some azo dyes, as well as for various pharmaceutical products. The presence of naphthalene in coal gas and tar is generally accepted as being due to secondary reactions brought about by high retort temperatures, producing polymerization of two benzene rings.

$$2\,C_6H_6 = C_{10}H_8 + C_2H_4$$
$$= C_{10}H_8 + 2H_2 + 2C.$$

As stated above, the major part of the naphthalene produced by the degradation and polymerization of the lower aromatic hydrocarbons is found in coal tar. A small quantity, however, owing to its volatility, is found as a constituent of the permanent gases comprising coal gas. Much of this is removed by the ordinary methods of purification, as is indicated by the following table:

Inlet of condensers . . .	80 grains per 100 c.ft.
Outlet of condensers . .	20–25 ,, ,, ,, ,,
Outlet of purifiers . . .	10–15 ,, ,, ,, ,,

[Alwyne Meade's "Modern Gas-Works Practice."]

The above table is only of value in so far as it indicates the reduction of the naphthalene content of gas by the various purification processes; being exact only for the conditions obtaining in the particular plant under observation.

The small quantity of naphthalene which exists in the gaseous or vapour state in coal gas after it has passed out to the district is, of course, the chief concern of the gas industry. Trouble is due to the extremely low density of the naphthalene body when deposited from the gas. It has been known to occupy 4000 times the volume of an equal weight of water. The change of physical state, and consequent deposition, is due to a reduction in the temperature of the gas; there being a constant relationship between the gas temperature and the amount of naphthalene carried by unit volume of gas.

Grains of Naphthalene to Saturate Dry Gas. [*Thomas, J.S.G.*]

Temperature. ° C.	Vapour Pressure of Naphthalene. Mm.	Grains of Naphthalene to Saturate 100 C.Ft. of Dry Gas at 15° C. and 760 Mm.
0	·0056	1·75
5	·0101	3·15
10	·0176	5·49
15	·0301	9·39
20	·0506	15·80
25	·0836	26·10

The effect of temperature reduction is augmented by any cause liable to produce friction.

The worst natural periods of trouble are the seasons of spring and autumn—moderately warm days being followed by relatively cold nights. This has long been noted in actual practice, as also has the fact that periods of complaint do not necessarily synchronize with the maximum quantity, or even the presence of any naphthalene in the gas at the station governor outlet. This is attributable to the fact that any body which is deposited may, under favourable conditions, be re-absorbed. The favourable condition in these circumstances is the presence of gas not saturated with naphthalene at the particular temperature obtaining. Should this unsaturated gas come into contact with previous deposits of naphthalene present in the main or service, a set of conditions nearer to equilibrium is set up, and some of the naphthalene carried forward. If the temperature of absorption is lower than the temperature at the point of supply, it is unlikely that trouble will result.

The remedial measures adopted may be divided into two classes, although it is the opinion of many people that the naphthalene question is primarily one of condensation, and by the employment of adequate measures at that stage can be eliminated. This is a controversial point outside the scope of this paper. The two classes of remedial measures are: (1) Preventive. (2) Corrective. Those of the former class aim at preventing the naphthalene present in the gas passing from the works to the district.

Superficially these would appear to be the sounder measures. The object of the corrective measures is twofold—first, the complete prevention of the deposition of the naphthalene which has passed out to the district, thus retaining it in its gaseous state up to, and including, the point of combustion. The second object is to ensure, in the event of the failure of the primary aim, that the naphthalene is deposited in compact form, preferably in solution.

PREVENTIVE MEASURES.

In the main, preventive measures consist in washing the gas before distribution with some solvent of naphthalene contained in a washer of the Livesey type. These include the well-known measures of Colson and Leather. The slight disadvantage of such processes is due to the stripping of the gas, to some extent, of those constituents which at present are more valuable in the gaseous than in the liquid form. An analysis of the oil employed may be of interest.

Specific gravity at 60° Fahr.	·994—·998
Distillation range—	
0° to 190° C.	45 p.ct.
190° to 216°	32 ,,
216°	23 ,,

Really it is a light creosote.

The oil, after saturation with naphthalene, is run to the tar well. The use of a few inches of oil, forming the top layer in an ordinary washer, has been found quite efficacious.

Dr. J. S. G. Thomas says: "In the case of moist coal gas between 0° and 30° C., it has been found that the saturation vapour pressure of naphthalene is less than that of dry coal gas. The ratio of the saturation naphthalene content of moist coal gas to the saturation naphthalene content of dry coal gas, approaches continuously more nearly to a ratio of equality as the temperature is raised from 0° to 30° C. Above 30° C., the saturation naphthalene content of moist coal gas is slightly greater than that of dry gas, this being explained on the basis of the condensation of a skin of water upon the naphthalene in the case of moist coal gas."

Since the saturation limits of dry gas are higher at the normal temperature than those of gas saturated with water vapour, and in view of the fact that gas distributed under ordinary conditions is saturated with water vapour, some attempt has been made to use this knowledge by desiccating the gas; the results being very satisfactory on the small scale tried. At the same time, a layer of oil is often employed in station meters and holders, this having a twofold action, partially preventing saturation with water vapour in the holder, and to some extent washing-out the naphthalene.

CORRECTIVE MEASURES.

The methods for the alleviation and prevention of naphthalene troubles (which for the purposes of this paper have been designated "corrective"), are almost without exception those in which a liquid is introduced into the gas stream at the normal atmospheric temperature. This is accomplished either by atomizing a ready solvent of naphthalene or by diverting a portion of the gas through a suitable hot carburetting device. In the latter case, the gas saturated with the solvent is subsequently returned to the main stream, and so to the district. It has been generally understood that certain hydrocarbon bodies present in coal gas—particularly the benzoles and naphthas—are capable of preventing the deposition of naphthalene, and for this reason have been spoken of as the "natural carriers of naphthalene." This point explains the theory of the usual corrective measures employed.

EXPERIMENTAL WORK.

With the object of proving the accuracy of this accepted assumption, determining the relative merits of the different solvents used, and of obtaining some information to show which type of treatment is of the greatest practical value, the experimental work which is the basis of this paper was carried out.

Any body in a state of vapour is absorbed and retained by coal gas in virtue of its vapour tension; the amount carried being mainly determined by the temperature obtaining, and the time contact between the two bodies concerned. This applies in particular to the naphthalene and to the solvent bodies employed. A limit is set to the amount which may be absorbed by the molecular percentage of the particular constituent present under any set of conditions, this being the saturation limit. The saturation limit in the case of naphthalene, as has already been shown, varies with the humidity of the gas.

For experimental purposes, three solvents were used: (1) Benzole. (2) Paraffin. (3) A trade solvent. The physical properties of the solvents were examined, and the following results obtained:

Distillation Ranges of the Various Solvents.

Particulars.	Benzole.	Paraffin.	Trade Solvent.
Sp. Gr. at 60° Fahr.	·864	·810	·828
P.ct. distilling 0	° C.	160° C.	150° C.
10	—	187	158
20	—	204	162
30	—	217	166
40	—	228	171
50	—	237	175
60	—	247	180
70	—	257	186
80	—	270	194
90	—	287	204
97·5	170° C.	—	—

The above tests were carried out in a 500 c.c. Wurtz flask; the thermometer being in the vapour. The naphthalene solvent powers of the different liquids were determined by the usual methods.

Solubility of Naphthalene in the Various Solvents.

Solvent.	P.Ct. Naphthalene (by Weight) to Produce Saturation.	
	50° Fahr.	70° Fahr.
Benzole	31·7	51·5
Paraffin	8·9	12·7
Trade solvent	10·6	17·1

It was deemed necessary to obtain some information concerning the amount of gas required to carry a given volume of solvent. This is not precisely the gas saturation limit of the solvent, but is nearly so in cases where the divergence between the vapour tensions of the constituents comprising the solvent is not very great. This is particularly so in the case of benzole.

In the table given below, the paraffin figure is noticeably low. This is explained when it is understood that, although at a temperature of 70° Fahr. fully 10,000 c.ft. of gas are required to carry completely 1·4 gallons of paraffin, should this quantity be sprayed into the given amount of gas saturation would not by any means be obtained. Industrial paraffin is a mixture of paraffinoid hydrocarbons covering a range of $C_{10}H_{22}$ (decane) to $C_{16}H_{34}$ (hexadecane), having a boiling point range of 173° to 287° C. These being widely divergent in boiling point, the lighter bodies, which have a relatively high volumetric saturation quantity, are more readily, and probably are the only bodies, absorbed when paraffin is projected into a stream of gas at a temperature more or less equal to that met with on the district.

Quantity of Solvent Completely Carried by 10,000 C.Ft. of Gas.

Solvent.	Gallons of Solvent Completely Absorbed and Retained at 70° Fahr. by 10,000 C.Ft. of Gas.
Benzole	13 0
Paraffin	1·4

In order to obtain the carrying effect of the various solvents when in the gaseous state, and to prevent the possibility of any stripping action due to the method of carburization, air was used in preference to gas. The vapour pressure of gas and air being closely related, the results are nearly identical, and at any rate comparative.

Vapour Pressure of Gas and Air.

Temperature.	Vapour Pressure in Mm. of Mercury.	
° C.	Air.	Gas.
0	·00538	—
12·98	—	—
19·86	—	—
24·80	·0845	·0837
34·60	·218	·217
44·86	·526	·534

The figures given are the results of a series of tests carried out at the extremes of temperature liable to be met with on the district. The temperature limits are sufficiently wide—although perhaps not as large as is actually the case in practice—to indicate the effect (if any) of the addition of solvent vapour to the gas or air. The average rate of flow through the apparatus was 0·4 c.ft. per hour. Whatever the temperature at which the solvent was introduced into the air or gas, the air or gas and solvent before contact with the naphthalene were brought to the required temperature of 50° or 70° Fahr. as the case may be.

A similar series of tests was made using dry gas instead of air; and although quite the same degree of saturation was not obtained, the results are in agreement. The conditions were identical with those of the previous series, with the exception that the temperature of carburization was lower, the intention being to reduce the volume of solvent carried.

Naphthalene Carrying Power of Dry Air and Dry Gas.

Solvent.	Dry Air.				Dry Gas.	
	At 50° Fahr.		At 70° Fahr.		At 70° Fahr.	
	Grains of Naphthalene per 100 C.Ft. Dry Gas at 60° Fahr. and 30 in.	Gallons Solvent per 10,000 C.Ft.	Grains of Naphthalene per 100 C.Ft. Dry Gas at 60° Fahr. and 30 in.	Gallons Solvent per 10,000 C.Ft.	Grains of Naphthalene per 100 C.Ft. Dry Gas at 60° Fahr. and 30 in.	Gallons Solvent per 10,000 C.Ft.
Nil	5·3	—	16·1	—	14·3	—
Paraffin	4·9	3·07	15·5	7·2	(*a*) 13·7	3·46
Benzole	4·9	4·69	16·4	7·3	(*c*) 13·7	5·54
Trade solvent	4·8	4·69	16·1	5·8	(*b*) 14·1	4·40

NOTE.—(*a*) The large amount of paraffin carried is due to the method of carburization; only the more volatile low-boiling-point con-

stituents being vaporized. The temperature of carburization was in this case 100° Fahr.

(*b*) The carburization with this solvent was carried out at a lower temperature than with paraffin, to prevent an excessive quantity being carried by the gas.

(*c*) Cold carburization, for the same reason as (*b*).

(*d*) Similar negative results were obtained when the gas or air used was moist.

While not increasing the naphthalene-carrying power of gas, the presence of a solvent may affect the retention of the naphthalene when conditions are normally favourable for its deposition. This probability was investigated experimentally, carburization being affected at 100° Fahr., with subsequent cooling to 50° Fahr. to ensure saturation with some constituent of the solvent. This was followed by "naphthalizing" at 70° Fahr., and the now prepared gas (which, by the way, was "wet") was re-cooled to 50° Fahr., and the naphthalene retained at that temperature estimated.

Naphthalene Retained by Wet Gas after Cooling.

Carburettor.	Grains of Naphthalene Retained at 50° Fahr. per 100 C.Ft. Wet Gas at 60° Fahr. and 30 in.
Nil	4·2
Paraffin*	4·4

* Amount of paraffin not estimated.

The results obtained are indicative of the fact that the solvents used do not increase or improve the normal naphthalene-carrying and retentive capabilities of air or coal gas. Although this is so, the presence of any solvent, while not affecting the amount of naphthalene carried, may affect the manner and form in which it is deposited from gas, should conditions be favourable. This contention was demonstrated visually on an experimental scale. It was noted that naphthalene, in the absence of any solvent, was deposited in very fine plates of low density. In the presence of a solvent, the form of the deposit depended upon the amount of the solvent present. When the solvent was present in such quantities that, on cooling, liquid was deposited (that is, some constituents of the solvent were present in quantities above their saturation limits for that particular temperature) naphthalene was deposited in a much more compact form—one more nearly akin to solution.

When the solvent was present in insufficient quantities to guarantee saturation, the naphthalene deposited was similar in structure and density to that deposited in the absence of any solvent. It would appear, therefore, that a naphthalene solvent present in the vapour state in coal gas does not behave towards naphthalene in the same manner as when in liquid form. There is no additional carrying power as regards naphthalene by reason of the presence of any body which in its liquid form is a ready solvent of naphthalene. The benefit derived from the presence of any solvent in coal gas containing naphthalene is only obtained during the transition of the solvent from the gaseous to the liquid state—a condition which is satisfied only if some constituent of the solvent is present in sufficient quantity to saturate the gas. Should any reduction of temperature take place, the condensed liquid and the $C_{10}H_8$, if the conditions are right for deposition, are brought down in the form of a semi-paste.

It is obvious that, in contending with the naphthalene trouble by the corrective method, the most satisfactory results will be obtained by the employment of a solvent having the lowest volumetric gas-saturation quantity, and possessing a reasonable solvent action upon the naphthalene when in the liquid state. It is impossible to saturate coal gas in the cold at the normal contact rates, whatever solvent is used. Saturation would best be obtained by projecting the solvent into the gas bulk stream at a temperature near its boiling point, or at any rate at one considerably higher than any obtaining on the district. For actual removal of stoppages, the solvent which will dissolve the greatest weight of naphthalene is obviously the one to use.

Finally, although the carbonization of coal in the more modern vertical retort, and the use of heavy charges in horizontals, have to some extent reduced the naphthalene evil, it still exists. As it is impossible on a practical works scale to eliminate all but one variable condition in order to obtain a true comparison of working results, it is hoped that the information contained in this paper may be of some practical value. I am firmly of the opinion, however, that the proper place for dealing with the naphthalene problem is the works.

I should like to put on record my thanks to my Chief, Mr. Charles Wood, F.C.S., for his kind permission to use the matter given in this paper, and to my colleague, Mr. G. Griffiths, for his assistance with the experimental work.

Discussion.

The PRESIDENT (Mr. W. Heathcote) said Mr. Ineson had thrown some light on an abstruse problem, which was a bugbear with every man who had anything to do with gas distribution. As a distribution man himself, he ventured to suggest, as seemed to be the view of the author, that it was up to the works men every time to see that this naphthalene did not get into the distribution mains. Once it got there, it was not easily removable; and the preventive cure was far more effective than the corrective. In a town in which he was formerly engaged they used to put the solvent into the mains in liquid form. It seemed as if the naphthalene and the solvent were carried down and deposited in some particular part of the main.

Mr. J. B. BALMFORTH (Bingley) remarked that the paper dealt with a very topical subject, especially this winter, which had been a bad one for extreme changes of temperature and for frosts. He (Mr. Balmforth) had a paraffin vaporizer which certainly seemed to be a corrective measure, but was a very slow process. It removed a great deal of the naphthalene, and if kept at it long enough would probably clear the system; but the question was, how long would it take to do so? He knew of a case in which the gas at the works was found to be free of naphthalene, and yet it was present and giving a great deal of trouble in the district. They were all aware that dry gas was not so liable to naphthalene deposit as was humid gas; and he was wondering whether a film of oil in the tanks of the gasholders might be a preventive measure, in keeping the gas dry. He had come to the conclusion that a good many complaints which were put down to naphthalene were really due to corrosion on the inner surface of mains. When gas-works were extracting benzole, there were many complaints about naphthalene. In some cases a lot of air was then being put into the gas; and this might have tended to create rusty surfaces of mains.

Mr. P. M'NAB (Low Moor) found that the use of oil on the surface of the water in the holders tended to prevent the inlet and outlet pipes getting choked with naphthalene.

Mr. H. WADSWORTH (Knaresborough) said the figures showed clearly that the better method was to take out the naphthalene before the gas left the works. He thought it had been proved that a rotary washer was more satisfactory for washing for complete elimination of naphthalene. Could Mr. Ineson tell the meeting the type of paraffin and benzole used?

Mr. T. R. MORTIMER (Brighouse) questioned whether the use of paraffin was very much good, considering how little naphthalene in the solid it dissolved.

Mr. INESON said he did not like to pin himself to a definite statement in regard to any particular trade appliance, but he fancied Mr. Balmforth would have to carry on a very long time with his paraffin vaporizer. He doubted whether it would have any really appreciable effect in the end. As to naphthalene being in the district and yet not present in the gas when it left the works, the explanation must be that the trouble was due to previous deposition of naphthalene in the mains. In regard to the aggravation of naphthalene trouble during the period of benzole extraction, this was not due to the removal of the so-called natural carriers, but to the fact that the creosote oil was saturated with naphthalene, which was later deposited, when the conditions were favourable, in the outside district. He could not see much prospect of success for oil in the holder, because there was only one inlet and one outlet pipe, and so little actual surface contact that only a small portion of the gas was anywhere near the oil.

Mr. M'NAB said he had not raised the point as to oil in the holders so much in the sense of whether it would alleviate naphthalene as whether it would tend to cause it. Some time ago it had been advocated to apply oil to the caps on holders to prevent corrosion, and also that they should be painted. He had seen it stated on another occasion that it caused naphthalene.

Mr. INESON replied that he did not think it would do so to any great degree. Nobody could say definitely that if the oil had not been in the holder there would not have been any naphthalene deposit. In answer to Mr. Mortimer's doubt as to the efficacy of paraffin, the whole function of the paper was to prove the point that the introduction of any normal liquid solvent of naphthalene was practically no good, without putting it in in a vapour state. If they bubbled a quantity of gas through a liquid seal of solvent, they would find that it only took up those bodies which were easiest to pick up—the low boiling point constituents—and never touched the higher boiling point constituents of paraffin. He was firmly of opinion that the best place for dealing with naphthalene trouble was on the works—which inferred that the preventive measures were the better.

Mr. BALMFORTH asked what method was adopted at Bradford.

Mr. INESON answered that he believed Mr. E. J. Sutcliffe gave a paper some years ago in regard to Bradford's way of dealing with naphthalene. The method in the main was corrective. The paraffin was sprayed, under water pressure, against the stream of gas at about 7 ft. distance from the governor inlet—ordinary commercial paraffin. Approximately 70 p.ct. of the paraffin was re-taken from the gas in the governor syphons, so only 30 p.ct. really got into the gas. How far they went into the district, he could not say; but probably some of it was found in the syphons on the works. This system was carried on intermittently. If any benefit was to be obtained from spraying paraffin into the gas he thought the paraffin should be heated to a high temperature so as to saturate the gas with its constituents. By the ordinary methods of carburization, they did not get saturation.

Mr. M'NAB could speak of at least one works in Bradford—his own at Low Moor—where the preventive method was applied, and there had been no naphthalene complaint for eight years.

Mr. C. ROPER (Bradford) said prior to the period of benzole extraction Bradford hardly knew of naphthalene complaints, and even to-day there were very few.

Mr. J. W. ROPER (Bradford) suggested that the use of heavier charges would help to keep down the trouble.

Mr. R. N. WEBB (Leeds) agreed with the last remark. To-day throughout Leeds they had very few complaints indeed, though he admitted the recent frost had caused some. Mr. Edwards (now at Beckton) had said it would do much good, at little cost, to use a Colman "Cyclone" tar extractor, immediately after the hydraulic main, so that the temperature of the tar at that point and the friction caused by the cyclone would help to throw out the naphthalene without bringing-down the benzene series of hydrocarbons. The war, however, had prevented their trying this method; and he would be glad if Mr. Ineson could give the meeting any idea as to whether it would have been of benefit. Certainly this was a trouble which ought to be cured at the works. It was not fair to the distribution men or to the public that naphthalene should be allowed to get into the district. He remembered a time when this trouble in the district was costing the Leeds undertaking something like £40 a day in digging-up streets in the

effort to cure the trouble. Such an expense would soon exceed the cost of plant to deal with the trouble at the works.

Mr. Ineson had no personal experience with the "Cyclone" tar extractor, but thought it would be of benefit. He said it was generally understood that if the tar which normally condensed out in the foul main were run in a counter system to the gas stream, it had a solvent effect. He wished to correct a little misunderstanding which might arise in the mind of Mr. Webb, and possibly of other speakers, in regard to his (Mr. Ineson's) remarks on the solution of paraffin and naphthalene. It was not a case of the paraffin bringing the naphthalene down with it. It was simply that the reduction in temperature pulled down both the naphthalene and the paraffin, and they condensed together in the form of a liquid.

A Member asked how far had Mr. Ineson known a solvent penetrate into the district, and how much percentage of naphthalene would it contain at that point.

Mr. Ineson said he could not give a definite opinion on that point. In his own experience, under the paraffin spray, fully 70 p.ct. was found within 7 ft. Naphthalene, to practically the same extent as was distributed on the works, had been found on the district 2 or 3 miles away.

Mr. Webb remarked that years ago his undertaking had applied, by means of compressed air, cold paraffin through a jet. They found even more than 70 p.ct. in the syphon within half-a-mile.

NOTES ON MODERN CARBONIZATION IN CONTINUOUS VERTICAL RETORTS.

By A. Y. Plant, of Halifax.

[**A Paper read before the Yorkshire Junior Gas Association, Dec. 15.**]

The evolution of vertical retorts in their modern form has taken place within the last fifteen to eighteen years; but the idea is not new. I do not wish to dwell upon historical details, but will briefly run over the ground. In the year 1828, John Brunton patented an intermittent system very similar in some respects to the installations of the present time. He discovered that the gas could not escape freely from the lowest part of the charge. To overcome this, he arranged a perforated pipe in the centre of the vertical charge, to relieve the pressure. It may be mentioned that there is room for improvement in this direction in modern installations. Another earlier system is the "Settle-Padfield." The retort commenced in a vertical plane, but turned off at an angle at the base; the coke discharging through the side of the bench, and not at the bottom. The charging of the retorts was arranged on the same lines as the continuous system, but the coke was withdrawn at definite intervals, so that the amount of free space in the retort was subject to variation. This system, though turning out to be a failure, embodied certain most valuable features. About the same time, Dr. Beub, who had been conducting experiments in vertical retorts in Germany, took out a patent dated July 2, 1902. This system, the Dessau, was also patented in England. In his patent he enlarges upon the trouble experienced from the gas in the lower part of the charge having to traverse the column of incandescent coke above it. To overcome this he suggested the heating of the retort on three sides only, and having a series of nostrils on the cool side, through which the gas could escape from all parts of the charge. This arrangement, which was not a success, was improved; and an experimental setting of verticals was erected at Mariendorff in July, 1904. The side exits were abandoned, and the gas had to find its way upwards through the charge. This system assumed more or less the form in which it exists to-day.

In the meantime, Messrs. Woodall and Duckham had taken out a patent, on July 27, 1903, for a continuous system of vertical retorts. This was followed by Messrs. Young and Glover taking out a patent on Nov. 17, 1905, also for a continuous system of vertical retorts, based on the Scottish shale-retort principle, of which Mr. William Young made a lifelong study. The late Mr. John West of Manchester, to whom we owe our greatest respect, brought his knowledge of engineering to bear upon the constructional details of the Glover-Young system of 1905. The result was introduced in 1909 as the Glover-West continuous vertical retort system, the efficiency and popularity of which is proved by the number of installations already erected.

In the continuous vertical retort, a higher yield of gas, and a higher percentage of bye-products and saleable coke of a better quality, are obtained per ton of coal carbonized. Each particle of coal is subjected to exactly similar treatment, the coal passing through various temperature zones in the retort; and therefore there is not the same trouble with uncarbonized particles of coal, as is the case near the mouthpieces of horizontal and inclined retorts. The labour cost per ton of coal carbonized is much less in the case of continuous verticals. The control of heat is more efficient in comparison with horizontal and inclined retorts. The settings are more sensitive to the slight adjustments of the dampers; but the multiple control of producer gas and secondary air on modern horizontal and inclined benches is a considerable improvement, and ensures an adjustment almost as perfect.

Supervision.

Supervision plays a great part in obtaining the full working efficiency of vertical retorts.

Producers.—In filling up the producers, use clean coke. Partly-carbonized coke has the effect of restraining the primary air supply by closing up the interstices; irregular combustion being the result. Also, a certain amount of heat is wasted by absorption in driving off the volatile constituents, though these constituents may be combustible.

Retort-House Governors.—Never exceed more than 1-10th pull on the retorts. Try to work to level gauge as near as possible, to maintain uniform composition. The effect of too much pull is one of the main causes of stopped pipes. Irregular distillation takes place, and inerts are liable to be drawn in.

Chimney Pull on the Setting.—With too much pull (and this will apply in the case of horizontal and inclined retorts) the ash content of the fuel is fluxed, with the consequent formation of clinker. With a slow draught, the heat of the producer furnace is reduced, minimizing the clinker content. A considerable improvement in this respect is the increased grate area allotted. This results in a slower travel of the primary air through the fuel bed, and less "slip" up the sides of the furnace.

Selection of Coal to be Carbonized.—This is a very important factor. To a certain extent any variety of coal can be carbonized in continuous vertical retorts, but different varieties of coal require different temperatures. Also, the travel of the coal in the retort varies considerably according to the varying characteristics of different coal.

Lubrication.—Avoid using vegetable and animal oils for extractor lubrication. Ammonia neutralizes the oils, and the salts crystallize out. Several forms of lubricator have been adopted for the gravity-bucket conveyor chain at Halifax; and the one proved to be most effective is worthy of note. It consists of a rectangular tin box for containing the oil, and a filter. Under the box is a gas-burner, to keep the oil sufficiently fluid under all atmospheric conditions. From the underside of the box is connected a horizontal ½-in. pipe, with four ¼-in. brass tubes fitted with taps for controlling the oil supply, supported directly over each chain link to give a clearance of 2½ in. At the extreme ends, 4-in. wick is inserted, so that it drags on the chain links when in motion. Four small wire brushes are arranged about 1 ft. 6 in. away from the tubes, to sweep the chain before the oily wick takes action.

Scurfing.—Each retort is taken off after working five or six weeks. After the retort has been emptied by the usual procedure, the bottom inspection rodding door on the extractor is opened about 4 in. to allow sufficient air to circulate up the retort, and burn-off the carbon.

A vertical chimney is fixed on the top of the mouthpiece, about 8 ft. high, and rectangular in cross-section, with side plates on the chimney cap, to throw any burning carbon sparks in a downward direction. This creates an extra vacuum in the retort; but the main feature of the device is that it speeds up considerably the usual time taken for scurfing a retort, and the fumes, heat, and carbon sparks are more confined. During the operation, the chimney keeps moderately cool. The time taken for scurfing a retort averages between 16 and 18 hours from being tied up to re-starting to work for gas-making. Avoid using bars for scurfing; this method damages the retorts.

Description of Drakes' Continuous Vertical Retorts Erected at the Halifax Gas-Works.

The verticals are built in the inclined retort house on the site of an old bench. The house lends itself admirably to this type of plant, which was completely housed without any alterations to the existing roof. Under the retort-bench runs the Hebble Brook; and this was bridged by steel compound girders, to carry the concentrated loads. The floor is of reinforced concrete. There is one bench of six settings, each containing eight retorts working in units of two, with separate external producers to each setting.

The retorts are elliptical in cross-section, and are uniformly tapered, being 12 in. by 27 in. at the top, and 21 in. by 36 in. at the bottom, to allow of easy passage for the carbonizing charge through the retort. The total length of the retort is 24 ft. 6 in. The bottom portion is of hard-burnt fireclay blocks, and built up from these are tongued and grooved silica segments, with the exception of the top, which is moulded in one piece. The throughput of each retort is between 2½ and 3 tons per 24 hours.

The coal and coke handling plants are driven by electric motors. Conveyors are of the gravity-bucket type. The coal on being received is tipped into the coal store, where it passes through the coal breaker (or is by-passed, if necessary) into the stationary rotary filler, which conveys it to the gravity buckets. It is then tipped into the coal bunkers, which hold a 24-hour supply. From the bunkers the coal travels to the retort feeding hoppers. At the base of the retort is the extractor; and at this point steam is admitted through a reducing nozzle at pressures varied to suit the quality of gas required. The extractor is designed with two drums working in combination, and revolving slowly on a horizontal axis. The coke passes into the receiving chamber, from which it is discharged every two hours. The travelling rotary filler takes it to the gravity-bucket conveyor, by which it is carried either to the screening plant or direct to the coal store for filling railway wagons.

There are two collecting mains to each setting, supported on top of the stack. At this point I would like to mention that we have not had any trouble with the formation of ammonium chloride in the collecting mains or round the retort-house governors. The gas up-take pipe from the collecting main leading to the foul main is sprayed with liquor, which prevents this for-

mation. On the stack platform are two retort-house governors, each of a capacity of 1½ million c.ft. per diem. Regular cleaning and examination of the governors is carried out once a week. There are two tar towers at the gable end of the stack. These are also cleaned out and examined once every two weeks.

The producers are furnished with step grates, which have not given the slightest trouble. The fires are clinkered three times per 24 hours, and the producers filled up twice per 8-hour shift. The producers supply four groups of two retorts each; each group being controlled by a main producer-gas damper. After passing round the retorts, the gases pass into the waste-gas flue through a Spencer-Bonecourt waste-heat boiler. The boiler is of the "Kirke" type, 6 ft. in diameter by approximately 18 ft. 6 in. long, provided with an economizer. The efficiency of the boiler, however, is so high that the economizer is not necessary. An electric motor and fan are supplied for inducing the waste gases through the tubes at a minimum velocity of 40 ft. per sec. The boiler is fitted with an automatic "Thermo" water-feed regulator. At the inlet to the products chamber, in the common waste-gas flue to the boiler, a superheater is fixed.

At Halifax, it has been found that in starting-up the boiler it is unnecessary to close the damper at the base of the stack chimney; the fan drawing whatever quantity of hot gas is required, and leaving any surplus to pass up the chimney. Under daily working conditions, the temperature of the waste gases entering the boiler may be taken to be about 650° C.; and the steam raised per hour from and at 212° Fahr. is 3700 lbs. The temperature of the waste gases leaving the boiler is about 180° C. The draught at the fan inlet is 2½ in. W.G., and at the boiler inlet, ⅝ in. The assistant engine-house man inspects the boiler every half-hour, and attends to the necessary lubrication.

48-Hour Test on Drakes' Verticals.

Retorts in action	41 (7 off)
Make of gas	3,512,000 c.ft.
Make from 48 retorts for 48 hours	4,111,610 ,,

This is equivalent to 42,830 c.ft. per retort per day and 342,640 c.ft. per bed per day.

Labour—

3 shifts of 3 stokers per shift.
3 ,, ,, 1 conveyor man per shift.
2 ,, ,, 2 firemen per shift.

Make per ton: From 187 tons of coal 3,512,000 c.ft. were obtained (equivalent to 18,780 c.ft. per ton of coal carbonized) with an average quality of 433 B.Th.U., equal to 81·32 therms per ton.

Particulars of Coke Produced during 24 Hours from 93·5 Tons of Coal Carbonized.

	T. Cwt. Qr.	Cwt. per Ton of Coal.
Total weight of coke produced	69 11 0	14·88
Coke used in producers	14 12 1	3·13
Coke produced for sale	54 18 3	11·75

The amount of coke used in the producers for carbonizing the coal is equivalent to 15·63 lbs. of coke per 100 lbs. of coal carbonized (under ordinary working conditions).

Analysis of Coke Drawn from the Retorts.

	P.Ct.
Moisture	0·30
Volatiles	0·90
Fixed carbon	90·20
Ash	8·60
	100·00
Sulphur content	0·59 p.ct.
Calorific value	11,070 B.Th.U. per lb.

Tar—	P.Ct.
Specific gravity	1·08
Water content	2·70
Free carbon	2·50

Analysis of Coal used during Test.

	Wet Basis. P.Ct.	Dry Basis, P.Ct.
Moisture	3·50	*Nil*
Volatile matter	33·00	34·20
Fixed carbon	60·00	62·17
Ash	3·50	3·63
Sulphur content	0·82	0·85
Calorific value (determinations made in a Mahler-Donkin bomb calorimeter) B.Th.U.	13,200	13,650

Discussion.

The PRESIDENT (Mr. W. Heathcote), opening the discussion, said that Mr. Plant was to be congratulated on his paper. The subject he had chosen was one on which there was a great diversity of opinion; and he believed this was the first occasion on which the Drakes' verticals had been the subject of a paper before the Yorkshire Junior Gas Association. It was doubly interesting because the Association would visit Halifax in January, when members would be able to examine any particular feature of the plant in which they were interested.

Mr. J. B. BALMFORTH (Bingley) said the paper would be more valuable if Mr. Plant gave comparative costs as to maintenance and working, as against other types of plant. This was a vital factor. When they considered the amount of heat wasted in the hot coke from horizontal retorts, it was appalling; and from this point of view alone he believed the vertical retort would hold sway in the future. With verticals, the working conditions for the men were better.

Mr. J. W. ROPER (Bradford) said that, in his view, the degradation of the gas in vertical retorts was much greater than in horizontals. He quite disagreed with the suggestion that vertical-retort coke was better than that from horizontal retorts. In Bradford they had both; and if it came to a question of price they could always sell horizontal retort coke better.

A MEMBER, alluding to the chimney used in scurfing, asked whether there was not a likelihood of the mouthpiece of the chimney becoming red hot.

Mr. J. W. LUPTON (Otley), speaking of the quality of the gas, asked what was the maximum B.Th.U. content producible in vertical retorts. Was it possible to maintain a continuous supply of 500 B.Th.U. gas? What would be the make of 500 B.Th.U. gas per ton of coal?

Mr. H. WADSWORTH (Knaresborough) asked whether Mr. Plant could give figures of working the retorts without steaming. It had been stated that the yield of gas and residuals was greater, and the coke better. An interesting point would be to know how much of this improvement was due to steaming. With figures without steaming, he thought they would be able to compare verticals and horizontals on a fairer basis. What was the strength of the liquor produced with the verticals, and what was done with the liquor in Mr. Plant's case?

Mr. G. WAGGETT (Bradford) asked why Mr. Plant regarded the coke from verticals as better than that from horizontals.

A MEMBER inquired as to how often the furnaces were clinkered.

Mr. R. N. WEBB (Leeds) said that there were one or two things Mr. Plant had said with which he could not agree. One was as to the cleanliness of the plant. Regarding a recent plant of 5 million c.ft. per day capacity, he must disagree with Mr. Plant in his suggestions that the vertical plant was cleaner, and that horizontals could not be run without hardship to the men. With a well-worked horizontal house to-day, the men had to contend with no more heat and no more dust than on a vertical plant. At any rate, this was what he judged from his own experience and observations of the horizontal and vertical installations at Leeds. In regard to the heat, he would suggest that the best possible method of extracting coke, and taking it away from horizontal retorts, had not yet been applied. In one method the men were protected from the heat by a shield. The coke was slaked immediately it came out of the retort, and it was possible for the telpher to begin work when the machinery had done the draw, and every retort was closed. He considered the worst feature of a telpher now in a horizontal works was that it had to work at the same time as the retort work was going on. With the best methods of charging and discharging, and taking away the coke, the workmen had less arduous work, dust trouble, and steam to bother with than in vertical-retort plants. The horizontal was much better than the inclined house, because in the latter the men had to draw the retorts, and face the heat of the coke. He would very much like to instal a coke-handling plant which he had designed. In regard to the costs of working, they in Leeds, with their old house, were making gas at such a rate that it was doubtful if it would pay to put in new verticals. He felt confident that he could decrease the working costs of his horizontal retort-house by over one-third if he could instal new plant on the principles that he would suggest. As to liquor, they would have no sale for their vertical plant liquor if it was impossible to increase the strength by the addition of that obtained from horizontals. Tar, of course, was a different matter, because, when distillers had to pay big prices for oils, the vertical tar came in for light oils. When they wanted pitch, horizontal retort tar was preferable. The production of tar and liquor depended very much on the nature of the market. Coke was another problem which depended on the consumer. He believed there were places where vertical coke was the best; but for metallurgical purposes, 12-hour horizontal coke was more like the coke-oven product than anything else produced on a gas-works. In regard to the cost of working, he believed that in a medium-sized works verticals would probably pay the best, but not so on a big works. If they got a house to produce 4 to 6 million c.ft. per day, the costs were about level; and it was a matter for the engineer to decide what plant he was most likely to find best, according to the amount of gas he had to make per day. Mr. Webb said the meeting would be interested to know whether Mr. Plant's figures were purely a test, or represented everyday working. When all was said and done, test figures were no good for a balance-sheet. It was everyday working that counted. If Mr. Plant had achieved nearly 18,500 c.ft. of 430 B.Th.U. gas per ton every day, they must have a very fine plant at Halifax.

A MEMBER asked how much steam Mr. Plant used. He assumed it must be very little, since he obtained a net yield of 11¾ cwt. of coke per ton, after deducting that used in the producers.

Mr. J. W. ROPER asked how Mr. Plant obtained a gross yield of 14·88 cwt. of coke when the volatile matter in the coal was 33 p.ct.

Mr. PLANT, replying to the discussion, said that in regard to financial comparisons as between verticals, horizontals, and inclined, he was not in a position to give comparative figures; but from the information given to him by his Chief, there was a decided difference in favour of verticals. In regard to the mouthpiece of the chimney for scurfing, it did not get red hot, but kept reasonably cool. The question of degradation depended largely on the coal carbonized. In his paper he was dealing with Yorkshire coals. With the regular working, they did not get the same amount of degradation with verticals. They could produce 520 B.Th.U. gas. The coke from verticals was of much better quality than that from horizontals. They had evidence of this in the case of one of the motor wagon drivers who went twice weekly from Halifax to Manchester, and who always asked for vertical coke. Vertical coke was brighter, and did not contain so much ash. He had not carried out a separate test in regard to steaming or non-steaming. A certain amount of steam was required to stop back-firing in vertical retorts. As to ammonia, they got 25 lbs. of neutral sulphate. The ammonia did not go through to assist in purification. It was all collected in the storage tank.

ILLUMINATING ENGINEERING SOCIETY.

Important Suggestions for Adequate Illumination.

At a meeting held at the Royal Society of Arts on Tuesday, Dec. 11, members of the Illuminating Engineering Society derived much enjoyment and benefit from a paper on "The Application of Scientific Illumination in Practice" presented by Messrs. G. Herbert and R. A. Ives. The chair was taken by Mr. Leon Gaster (Hon. Secretary of the Society), and the large attendance was an excellent indication of the deepening interest which is taken in the scientific study of illumination. This enthusiasm is all to the good; for the social, physiological, and psychological effects of good illumination are far too important to be dealt with in an indifferent and half-hearted manner. In introducing the authors of the paper, the Chairman said that its title denoted what the Illuminating Society stood for at present, and what it would stand for in the future.

FACTS AND SUGGESTIONS FROM THE PAPER.

In a paper wealthy in suggestion, the authors state that the attention which has been paid by lighting engineers to the question of glare, and the continual insistence of the need for screening light in the direct range of vision, are bringing about a different outlook among the public, who now more or less understand the principle of "light on the object—not in the eye." The terms "foot-candle" and "lumen" are better comprehended by most concerned with lighting; while even non-technical people, though they may not understand these terms, readily grasp the fact that the fundamental idea is the actual illumination on the place of work, rather than the apparent brightness of the source of light. One of the first problems in approaching the consumer is to consider his natural query: "What is good lighting?" This can be answered by the principles outlined in the Home Office Committee's reports—sufficiency and uniformity of illumination over the working area, avoidance of glare and inconvenient shadows, constancy of the light source, and the elimination of excessive contrasts.

One of the most difficult points to determine scientifically is the amount of illumination necessary for various purposes. There are several factors contributing to this difficulty, and perhaps the chief is the lack of knowledge on the consumer's part as to what good lighting really means. The average consumer is reluctant to appreciate how necessary, and how economical, it is to instal good lighting. He has not the slightest interest in watts, but he is interested in effects—the benefits to be enjoyed. Education of the public in lighting matters is essential, but only to the extent of proving to them the many advantages, and enabling them to visualize what they are actually purchasing in illumination. If it can be proved to the consumer that poor lighting is one of the most prolific causes of damaged material, and, further, that with correct illumination his output will automatically increase from anything up to 12 p.ct., he should be more than half convinced. A general case is that of a spinning mill, where very often the building has been well designed, the machinery excellently fitted, and the walls and ceilings are perfectly white; and yet bare lamps are installed on ordinary drop pendants. Naturally, a low intensity of illumination on the work is the result. No complaints are made by employees, because they have never enjoyed a better standard; and no complaints are voiced by the management, because they are unaware to what extent they are suffering financially, or how their employees' health is being undermined. The lighting engineer, and, indeed, all engaged in this section of industry have a wonderful service to offer. Good lighting in industry means 12 p.ct. more production, 25 p.ct. less spoilage, and 25 p.ct. fewer accidents. These are the three most important factors in the success of industrial operations—output, speed, and safety. In many modern factories a general illumination of 10 foot-candles or more is most desirable. There is every reason to believe that this is more than justified by the easier conditions of work. Certainly, wherever higher values are adopted, there is no wish to return to the old conditions.

Following the paper, Mr. Herbert, by means of lantern slides, demonstrated the method of planning adopted in various lighting installations, and showed the effects of simultaneous contrast, and the action of ultra-violet light on sulphate of quinine.

DISCUSSION.

Most of the discussion centred round the controversial subject of the intensity of illumination it was most desirable to adopt. Capt. E. Stroud suggested that 10 foot-candles was far too high, and bore out his statements by showing on the screen examples of highly satisfactorily general lighting giving an illumination of 4 to 5 foot-candles on the working plane. On the other hand, Mr. Haydn T. Harrison advocated the adoption of much higher values, and the reduction of intrinsic brilliancies. Daylight illumination was of the value of 20 foot-candles. Why should not this be the aim of artificial lighting? Mr. W. E. Bush and Mr. G. Campbell supported this argument; the latter speaker urging the abolition of local lighting. Mr. J. G. Clark (Gas Light and Coke Company) also took part in the discussion. It should be emphasized, he said, that good illumination ensures economy and better work. Of course, it was often a difficult matter to convince a potential consumer of the many advantages of good lighting. Even in one factory it was not uncommon to find that workers differed greatly in their conception of satisfactory illumination. Many were influenced by mere fancy; others, having had no experience of good lighting, were incapable of forming a balanced judgment. He remembered one case of a workman who said that for his type of work a movable light was essential. This was installed, but after several adjustments the position was never altered—the man had found the optimum position. All his experience had served to stress the fact that it was absurd to urge strict obedience to any sharply-defined set of rules. He had often encountered workrooms in which corners were not used because they were insufficiently illuminated. Undoubtedly, much still remained to be accomplished in the lighting field. He, too, advocated illumination of greater intensities. Mr. J. S. Dow spoke of the work of the Illuminating Engineering Society. It was a connecting link between the consumer and the manufacturer; and the impartiality of its recommendations was of the utmost value. He also referred to the way in which Mr. Gaster had worked for the welfare of the Society, and through it for the benefit of the community in general. No effort had been spared to raise the standard of illumination throughout the country.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Tully-Gas Analysis.

SIR,—On Aug. 31 I wrote to the Tully Gas Syndicate stating that I was desirous of obtaining typical analyses of various gases, and asking to be supplied with such an analysis of Tully gas. To this letter I received no reply; and on being presented with an analysis which I was informed was strictly typical of the performance of a particular Tully-gas plant, I had no hesitation in availing myself of the information given.

I regret that it is impossible for me to verify Mr. Tully's figures; but until they are vouched for by some independent and competent authority, I should prefer to accept those given in my paper. I imagine Mr. Tully's figures and deductions are apt to require verification, because I see he "presumes" that column K, Appendix 6, of my paper refers to York gas. There were several ways open to Mr. Tully to have disproved this theory, had he taken a little time to think before writing.

H. E. BLOOR,
Engineer.

Gas Company, Davygate, York,
Dec. 20, 1923.

The Macdonald Gas Analysis Apparatus.

SIR,—In your editorial criticism of my patent gas analysis apparatus, you refer to the likelihood of the air used for the explosion containing an appreciable amount of carbon dioxide. I would draw your attention to the fact that my directions call for removing the carbon dioxide from the air by passing to the caustic soda pipette before measuring it (*vide* "JOURNAL" for Dec. 19, page 780). I agree with you that to take 20·9 p.ct. as the oxygen content of the air, without removing the carbon dioxide as I do, would lead to very serious errors.

The production of oxides of nitrogen is negligible in a slow explosion under vacuum, as in my apparatus. The "complicated calculation of results" boils down in practice to a few simple arithmetical sums; and I have not found my assistants hampered by it in any way. The amount of gas taken for explosion is more than a quarter of the residue from the absorptions, so that errors from this source are reduced to a minimum.

Finally, Sir, I think my examples in the article speak for themselves as to the accuracy of my apparatus, especially when I point out that I have actually checked the carbon monoxide figure by having a duplicate sample analyzed by the Bunte or the Orsat; the results always being in close accord with those obtained by the "Macdonald" apparatus.

D. MACKENZIE MACDONALD.

27, *The Chine,*
Muswell Hill, N. 10.

[In making the criticism referred to, we had in mind the fact that the carbon dioxide was removed from the air before measuring it. The carbon dioxide is formed at the expense of the oxygen content of the air. Thus, in air containing 2·0 p.ct. of carbon dioxide, the figure for oxygen would be 18·9, while the nitrogen content would remain unchanged—viz., 79·1. Recalculating the relative proportions of oxygen and nitrogen after carbon dioxide removal, the figures are 19·3 p.ct. and 80·7 p.ct. respectively—and not 20·9 and 79·1, as would be inferred from the opening paragraph of the above letter. This is the point to which we drew attention; for, of course, in every gas analysis apparatus the carbon dioxide in the air should be removed before explosion.—ED. "G. J."]

Sulzer Dry Coke Cooling Plant.

SIR,—In the paper of Mr. J. S. Thorman, read before the Southern Association of Gas Engineers, at their annual meeting, and reported in the "JOURNAL" on Nov. 28, reference is made to the Sulzer patent method of dry coke cooling. As the statements made therein are somewhat inaccurate, and the conclusions drawn therefrom misleading, we shall be glad if you will allow us space to correct these wrong impressions.

In the first place, the statement is made that "it is claimed that 700 lbs. of steam at 100 lbs. pressure can be generated per ton of coke—equal to 350 lbs. of steam per ton of coal carbonized." As a matter

of fact, we claim that up to 1000 lbs. of steam may be generated per ton of coke; and in actual practice over 900 lbs. of steam per ton of coke is being regularly produced in a plant which has been in operation continuously for over twelve months—viz., that installed by ourselves at the Keilehaven Gas-Works, Rotterdam. So successful has this installation proved, that a duplicate plant has been ordered by the same Company, and erection will shortly commence. The first of these plants, which came into regular commission in December of last year, is handling 80 tons of coke daily (the capacity of the plant is equal to handling 96 tons in sixteen hours). At Homecourt, a plant is being installed to handle 1000 tons of coke daily, while several other similar installations are to be commenced shortly.

The final statement made by Mr. Thorman, that "the heavy capital cost of such an installation, in addition to the space required, prevents its recommendation," is not borne out by facts. So far as the capital cost is concerned, it may interest your readers to learn that, in a design prepared for an English Company, the capital outlay upon a plant to handle 140 tons of coke daily amounted to approximately £11,000, and the total capital outlay would be recovered in a period of 2½ years.

The savings to be effected by a Sulzer dry coke cooling plant are as follows:

(*a*) Production of steam for works processes and power.
(*b*) Saving by using dry coke in water-gas plants and for direct steam-raising plants. (The water in wet quenched coke must be evaporated; thus part of the calorific value is absorbed in a non-productive process.)
(*c*) Saving of the whole of the water used in a wet quenching plant, which amounts to 160 to 200 gallons per ton of coke handled—no inconsiderable item.
(*d*) In cases where the hot-coke skip is introduced bodily into the quenching tank, a portion of the coke is absorbed in the production of a water gas which is lost in the atmosphere.
(*e*) Reduction in the breeze content, and prevention of cracks in the coke due to contraction in wet quenching.

The whole of the above savings can be calculated with reasonable accuracy in terms of money; but, in addition, other remarkable advantages are obtained which have not at present been expressed in monetary values. These are:

(*a*) Less wear and tear of existing metal parts of the buildings, including conveyors, by the absence of vapours containing sulphuric acid.
(*b*) Manual labour is reduced to a minimum.
(*c*) In new plants the capital outlay in steam-boiler plant is omitted.

With reference to the space required for the Sulzer dry coke cooling plant, it may be stated that, in the Keilehaven apparatus referred to above, the total floor space of the dry coke cooling plant is only 800 sq.ft. The requirement of such a small space cannot prevent the recommendation of a system which will recover the total capital outlay in such a short period, and thereafter produce heavy annual returns, together with the many other advantages enumerated above.

We shall be pleased to give any interested reader more detailed information.

For SULZER BROS.,
F. J. PHILLIPS.

7, Bedford Square, London, W.C.,
Dec. 18, 1923.

Gas Coke Supplies and Use.

SIR,—In your issue of the 12th inst., there is an article [p. 703] on "Gas Coke Supplies and Use," in which reference is made to low-temperature carbonization; and as one who has gone carefully into the merits of the process now evolved by Low-Temperature Carbonisation, Ltd., I should be grateful if you would allow me to make a few remarks.

As regards the suggestion that the process is still in the experimental stage, the Company's working of twenty retorts, carbonizing 200 tons of coal a week for two years, seems to belie this; and had the gas world realized the advantages of the system, there should by now have been many plants working. However, the process will soon be operating on a very large scale. According to the "Financial Times," the Company expects to have plants in operation by the end of 1924 turning out 3000 tons of coalite a day; and this confirms my own information. The first 200 retorts, carbonizing 270 tons of coal a day, should be in operation by the New Year. The first series of retorts takes time to manufacture and erect; those following, having been standardized, will be rapidly turned out; and 1000 retorts should be in operation on various sites by the middle of 1924.

It is to be remembered that any one of three things may be the main product, and the other two the bye-products. For example, in the case of a Government installation, the production of oil fuel for their navy would probably be the main object; and, although a few gallons of motor spirit may not stir Dr. W. R. Ormandy into active appreciation, still it may have an exhilarating effect on those who are capable of looking forward into the future. For instance, assuming 4000 tons a day are being carbonized in 1925, 28 million gallons of oil, superior to Diesel, would be produced annually, and from it and the gas can be obtained 4,200,000 gallons of motor spirit. As to a market for this smokeless fuel, a million tons per annum have been sold ahead at the price of the best domestic coal for a period of years.

With regard to the statement that the capital expenditure per ton of coal carbonized is too great, I may say that the price, erected, as quoted to me, is £180 per ton of coal treated per day, and the all-in working costs are 6s. 4d. per ton treated, using producer gas. Let your readers work out the proposition for themselves, taking 6s. 4d. as working costs. The result of 128 days' run on nearly all Staffordshire and Yorkshire coal gave, per ton treated:

15 cwt. of smokeless fuel.
20·9 gallons of oil.
40 therms of gas of 829·9 B.Th.U.
20 lbs. sulphate of ammonia.

Take the cost of washed coal at 20s. a ton, the price f.o.r. for smokeless fuel at 31s. a ton, the oil in bulk at 4d. a gallon, sulphate of ammonia at usual prices, and gas at 2d. a therm, and let us omit all question of motor spirit.

As to the open household grate, low-temperature fuel radiates over 75 p.ct. more heat than the best domestic coal of 14,800 B.Th.U., and burns 1½ times as long; further, it has only about 8 p.ct. of ash, and consequently the value of the latter is less than half of that of the former. The case is explained when it is realized that coal with 14,800 B.Th.U. radiates only 7000 B.Th.U., whereas smokeless fuel, with 14,000 B.Th.U., radiates 13,000 B.Th.U.

I have lately tried fires of both coalite and coke, of equal dimensions, on consecutive days; and whereas, sitting at a table over 12 ft. from the former, I have been quite sensible of the radiated heat, I have felt none with the latter at 6 ft. The fault of coke, apart from the large percentage of inert matter contained in most samples, is that such a draught is required that, in a domestic fireplace, a large proportion of the heat passes up the chimney.

For steam raising, the correct method is to use coalite in a powdered form, without all the disadvantages of powdered coal. There is no slagging, practically no moisture, greater heat, and 86 p.ct. efficiency. It can, of course, be used in ordinary form under boilers, but arrangements would have to be introduced for greatly damping-down the draught, or too great a heat would be obtained. The following illustration serves: I had an anthracite cooking range, and could not obtain sufficient heat. I thought coalite would make good the deficiency, and gave no instructions to damp-down. The result was that the heat in several places cracked the firebrick lining. In any new installation, of course, the chimneys could be greatly reduced in flue area and height.

The moisture in coalite, after carting in heavy rain, amounts to 4·6 p.ct., and, this being mostly surface moisture, dries quickly. Very interesting experiments were carried out by Prof. Robert H. Smith, which show the superiority of coalite over the best Welsh steam coal of 15,000 to 16,000 B.Th.U. Among other points, full steam was obtained in half the time.

As regards cost, the Company have lately produced from screenings of unwashed semi-coking coals an excellent industrial coalite, which has found a ready sale at the works at good prices. In any case, there is plenty of room for both materials; and Low-Temperature Carbonisation, Ltd., will for some time be fully employed in supplying the domestic coalite already contracted for, and in the industrial field will only be concerned in turning into national wealth the large quantities of semi-coking and non-coking smalls at present abandoned at the pits.

F. A. WILSON.

24, Bina Gardens, London, S.W.,
Dec. 17, 1923.

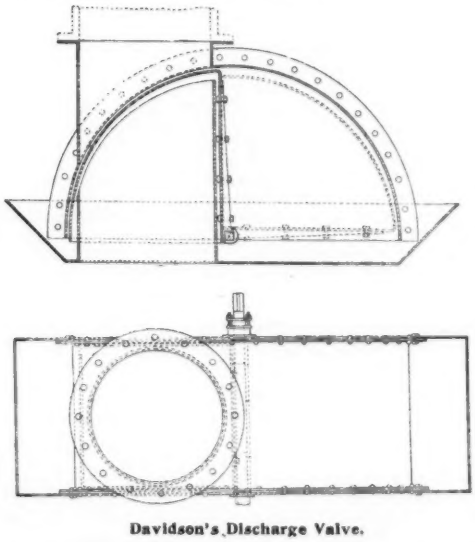
REGISTER OF PATENTS.

Closures for Retorts.—No. 206,560.

DAVIDSON, T. M., of Bromley.

No. 19,294; July 13, 1922.

This invention has for its object to provide an improved construction of discharge valve for vertical or inclined retorts.



Davidson's Discharge Valve.

We reproduce a sectional elevation and plan of the invention. It will be seen that the door is of a circular segmental form and adapted to be moved about an axis laterally disposed with reference to the axis of the retort.

A casing encloses the door, and the two form a hood which, in the position closing the retort, encloses the discharge passage and dips into a liquid seal maintained in a dish-shaped receptacle.

Prepayment Mechanism.—No. 206,553.

ANDERSON, J., of Edinburgh.

No. 18,598; July 6, 1922.

The patentee points out that matter suspended in town gas sometimes prevents full closure of meter valves, and is liable to strain the

mechanism in the case of a "solid" drive. The object of the present invention, therefore, is to provide an arrangement according to which the parts are not unduly strained, even should the valve remain partially open.

The claims are for: Prepayment mechanism, employing epicyclic measuring-out gear, in which there is provided a friction connection between the meter wheel and the first element of the epicyclic train driven by it; epicyclic measuring-out mechanism as described or claimed in patent No. 183,157 [see "JOURNAL" for Aug. 30, 1922, p. 478] in which the planet pinion, instead of being screwed to the meter-driven wheel, is attached thereto by being journalled on an arm held to the aforesaid wheel by friction means.

Steam Superheaters.—No. 206,593.

SOUTH METROPOLITAN GAS COMPANY, CHANDLER, D., and COOKE, J. J., all of Old Kent Road, S.E. 15.

No. 21,723; Aug. 9, 1922.

This invention relates to superheaters specially applicable for use in connection with calenders for laundry work, and other press-working plant. Wet steam is admitted at a tangent to a circular steam box, and the superheated steam is discharged through an outlet in the centre.

The steam box may comprise a top and bottom plate enclosing a spiral strip which forms a passage for the steam. The box is contained within a chamber which is supported on legs and provided at the bottom with a number of burners to which coal gas may be supplied. A flue outlet is arranged at the top of the casing.

Holes for the admission of secondary air are provided in the bottom of the casing; and inside the top fins or ribs are provided.

Radiators.—No. 206,652.

YEATS, H. E., of Kingston-upon-Hull.

No. 26,507; Oct. 2, 1922.

This invention relates to hot-water radiators of the gas-heated sectional type, a number of contiguous units being heated by a burner disposed horizontally beneath them. The patentee's object is to avoid the danger of skirting boards, flooring, or clothing catching fire from the flames.

Accordingly, the feature of the invention is that the units are extended below the water space and entirely enclose the burner, which passes through orifices left for the purpose in each unit except that at one end, the outside plate of which acts as a support for the burner. The other end has its orifice closable by a cover-plate. The lower extremity of each unit is holed for the admission of air to the burner. The latter is in the form of a perforated pipe, and is fitted with a regulator. The complete appliance is illustrated and covered by the claims.

Gas-Fire Burners—No. 206,697.

FRICKER, E. H., of Exeter.

No. 30,124; Nov. 3, 1922.

This invention has for its object to provide simple and effective means for adjusting the volume of mixture passing from the nozzles of a gas fire burner. The adjustment is attained by altering the compression of a spiral spring through the interstices of which the mixture passes, thus offering more or less passage-way to it.

The spiral spring is within a chamber immediately beneath the nozzle; and an adjustable plug, screw-threaded on its periphery, is provided, which is adapted so that one end of the spiral spring abuts against it. This plate or plug is so disposed in alignment with the outlet orifice of the nozzle that it is accessible for adjustment—as, for example, by the provision of a diametric slot on its face, by which it may be engaged with a screw-driver, and rotated within the casing. As one end of the spring bears on the plug and the other against the fixed end of the chamber beneath the nozzle, such rotation will vary the compression of the spring and allow more or less gas-mixture to pass.

Low-Temperature Distillation of Non-Coking Materials.—No. 206,712.

KOPPERS, H., of Essen-Ruhr.

No. 31,962; Nov. 22, 1922.

The distillation of gas from non-coking bituminous materials, says the patentee, is often effected in cylindrical shaft ovens, called "Rolle" ovens, in which the material is caused, by means of a set of rings superimposed in the manner of the slats of a Venetian blind, to slide down along the heated walls in a thin layer; the gases produced enter freely into the interior through the openings between the slats.

Cylindrical ovens, however, are imputed with certain disadvantages, and according to the present invention the distillation is effected within rectangular chambers, in which the slats extend lengthwise along the side walls, from front to rear, leaving, between the walls and the adjacent sets of slats, space for the charge to descend in more or less thin layers.

The process is continuous; uninterrupted operations being obtained by the fact that the openings between the slats are raked in longitudinal direction with the help of poker bars from the front. This is effected by continuously moving scrapers engaging the openings; but similar effect may be produced by periodically shaking the slat framing.

The shape of the chambers allows of a combination of a plurality of ovens so as to form a battery, which means, besides a large output on a limited area, constructional and operative compactness as well as the best conditions for thermal economy. The gas and air for combustion are united at the lower end of a vertical combustion chamber, while the products of combustion are distributed, through an upper distribution channel, over the entire length of the heating walls, and pass through the walls downwards.

Side Sheeting of Spiral-Guided Gasholders. No. 206,791.

DEMPSTER, R. & J., LTD., and BEARD, G. F. H., both of Manchester.

No. 12,949; May 15, 1923.

The invention relates to the extreme top and bottom sheets of a gasholder lift to which the spiral guide-rail is attached. The patentees point out that at present it is customary to form a diagonal gap in the sheeting from top to bottom of the lift, and then plate the gap with uniform sheeting to which the guide-rail is attached. Additional strength is required in the first and last tiers of the sheeting; and this strength is gained by using plates of a thickness greater than that of the intermediate sheets. Under the present system, these stronger top and bottom plates, having such a gap in each of them, again become weakened thereby.

The object of this invention is to provide a base plate which, instead of being equal in width throughout (as already employed), is widened out or extended at the top and bottom, or specially formed; such widened out parts being integral parts of the thickened plates, and forming sheets of the top and bottom tiers, thus obviating the necessity of forming a diagonal gap in the thickened plates.

Dry Gas-Meters.—No. 207,072.

COOKE, A. G., and PHILLIPS, B. C., both of Hove [Messrs. Joymanco (Brighton), Ltd.].

No. 411; Jan. 5, 1923.

The meter diaphragm of which the construction is covered by this specification was the subject of a short illustrated article, "The 'C.P.' Diaphragm," on p. 659 of the "JOURNAL" for Dec. 5. The objects of the invention are to provide a simple and efficient means of attaching the leather to the rim, to eliminate cracking and puncturing of the diaphragm, to minimize the skill called-for in assembling the parts, and to render possible the adjustment of capacity so as to suit any type of dry meter.

1. The improved measuring chamber comprises a metallic tapered rim with the inner end turned outwards and soldered to the partition, an annular recess swaged in the interior, and the outer end curved outwards for receiving and supporting the diaphragm of flexible material, the outer edge of which is stitched over a wire ring.

2. The diaphragm of flexible material is interposed between two metallic discs by means of a lug and nut, a metal cap lightly soldered over the nut, and an annular groove swaged in the discs, providing a gas-tight joint.

3. The diaphragm is connected to the tapered rim by a split ring having a depression in each end. The ends overlap, permitting proper adjustment of the diaphragm to the required capacity, and are then forced into contiguity; a protecting piece being interposed between the ring joint and diaphragm for eliminating the puncturing of the flexible material.

4. An improved measuring chamber of the character described wherein the puckering and puncturing of the flexible material is entirely prevented, being constructed and arranged substantially as set forth and shown.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Dec. 19.]

Nos. 30,937 to 31,554.

BAILEY, R. W.—"Gas or oil power plant." No. 31,445.
BELL, H.—"Rotary pumps, meters, &c." No. 31,108.
BRAKEFIELD, W.—"Gas or oil-vapour engines." No. 31,315.
BROCKWAY, F. G.—"Incandescent gas-burners." No. 30,966.
CHANEY, W.—"Manufacture of coal gas and water gas." No. 31,454.
COKE AND GAS OVENS, LTD.—"Plate condensers, &c." No. 31,127.
FLOYD, C. S.—"Gas-purifiers, &c." No. 31,415.
FÜLSCHER, J.—"Apparatus for cooling coke." No. 31,508.
HERSEY, S.—"Apparatus for effecting intimate contact between liquids and gases." No. 31,256.
HODGSON, J. L.—"Temperature control apparatus." No. 31,196.
JOHNSTON, E. W.—"Thermostatic cut-outs." No. 31,466.
KIRKHAM, HULETT, & CHANDLER, LTD.—See Hersey, S. No. 31,256.
LOFTUS, T. J.—See Bell, H. No. 31,108.
METROPOLITAN-VICKERS ELECTRICAL COMPANY.—See Bailey, R. W. No. 31,445.
NEATH, J.—See Chaney, W. No. 31,454.
PERRY, H. H.—"Regenerators for air and gases." No. 31,336.
STILL, C.—See Coke and Gas Ovens, Ltd. No. 31,127.
UETLING, F. F.—"Combustible recorder for measuring constituents of a gas or fluid." No. 31,235.

Quality of Stockton Gas.—Mr. A. C. Wilson, Official Analyst of Stockton-on-Tees, in a letter to the Press, states that he determined the sulphur in the gas on Dec. 11, and found it to contain 50·25 grains per 100 c.ft. The gas supplied to the borough of Middlesbrough quite recently showed only 8 grains of sulphur per 100 c.ft. He adds that, while there is now no legal obligation upon the gas department to keep these impurities out, there is certainly no advantage to the consumer in leaving them in, and there is a very grave risk of causing serious injury to health if they are not kept within reasonable limits.

LEGAL INTELLIGENCE.

Sequel to a Gas Explosion.

His Honour Judge the Hon. W. B. Lindley heard recently, at the Williton County Court, an action which arose owing to damage done to house property in South Road, Watchet, due to an explosion of gas. The plaintiffs were the Watchet and Williton Gas Company, Ltd., and the defendant Harry Nethercott, traction-engine proprietor; it being alleged that the explosion was due to the negligence of the driver of his steam lorry. The sum of £50 was claimed as damages. Mr. J. A. C. Kennard (for the plaintiffs) said the action was brought because it was alleged that defendant, while conveying stones in a motor vehicle for the erection of the Masonic Hall in South Road, Watchet, fractured a gas-main; the gas escaping into a disused old drain, a branch of which ran up to Temple Villas. On the morning of Nov. 3, 1922, an explosion occurred which wrecked the back premises of one of the houses. Plaintiffs contended that the cause of the fracture of the gas-main was defendant's motor lorry being driven in a negligent manner, after warning had been given that there was danger owing to the presence of a trench in which were gas and water mains, and also that when the wheels of the lorry sank into the trench the wrong methods were at first adopted in trying to get them out. Mr. A. M. Stephenson (the Manager of the Gas Company) said that after the wheels had sunk into the ground he suggested that a jack should be sent for. This was ultimately done, but other unsuccessful methods of extrication were first tried. The pipe which was fractured was the trunk main. The defence submitted by Mr. Clarke was, in the first place, that there was no negligence; and his Honour found that the plaintiffs had failed to prove that there was any. He thought the trench had not been properly filled in, and that there was a dangerous place in the road, for which the plaintiffs were responsible. The action was dismissed, with costs.

Re W. G. Field (trading as W. G. Field & Co.).

At the Bankruptcy Buildings, Carey Street, W.C., on Tuesday of last week, the public examination was held of William George Field, trading as W. G. Field & Co. In 1918, with about £2000 capital, debtor commenced business as a gas mantle manufacturer in Evelyn Street, Deptford, but the business proved unsuccessful, and was carried on until Feb., 1921, at a loss. In conjunction with other persons, he then formed a Company called W. G. Field & Co., Ltd., to acquire the business. He acted as Managing-Director without remuneration until May last, when a Receiver for the debenture holders was appointed. From April, 1921, to May last he also carried on a similar business on his own account from the Company's premises. He attributed his failure to depression in trade; to his net profits having been insufficient to meet his household and personal expenses; to the failure of W. G. Field & Co., Ltd., to discharge about £800 of the liabilities taken over by them; to depreciation in the value of his shares in that Company; and to liability on a bill of exchange for which he received no consideration. He had not kept any books of account in connection with his business. Debtor had lodged a statement of affairs showing ranking liabilities £2122 8s. 7d., and net assets £2 15s. 4d.

"Underground London."—On Wednesday, the 12th inst., before the Southend-on-Sea Rotary Club, Mr. W. J. Liberty, of the Engineers' Department of the Corporation of London, gave an illustrated lecture on this subject, dealing with mains and mainlaying in Central London, obstructions, &c. He also referred to the recent accident in connection with the enlargement of the City and South London Tube Railway, illustrating this with lantern slides showing the apparent cause and the results. By the aid of many specially prepared slides, he was able to give the members an idea of modern underground London.

Coal Supplies for Belfast.—Mr. J. D. Smith (the Gas Engineer), having been requested by the Belfast Corporation to report on the desirability or otherwise of the Council obtaining parliamentary powers to enable them to import coal and establish depôts in various districts of the city for the sale of coal to the citizens, has strongly recommended the Council not to entertain the idea. He considered the Gas Committee would be very ill advised to enter the coal market in competition with regular traders. Their concern should rather be to encourage the use of gas for heating and cooking, and thus do away with the smoke problem. The use of coal for household purposes stood condemned, on account of its wastefulness and pollution of the atmosphere, and the welfare and health of the citizens demanded that they should discourage the use of coal as much as possible.

Yorkshire Gas Coal Contracts.—At the annual meeting of the West Yorkshire Gas Coal Owners' Association in Leeds, it was reported that certain gas-works, notwithstanding that many current contracts do not expire until June next, had been trying to arrange for renewal for the twelve months ending about June, 1925. In some cases, it was stated, gas-works had covered for a portion of their requirements at a reduction in the present contract prices. Amazement was expressed that any responsible colliery company should, having regard to the present unsettled state of things, have committed themselves so far forward, and still greater amazement that a reduction in prices should have been agreed to. It was suggested that this situation was the result of a calculation made by gas coal factors or middlemen who had pressed their views upon gas-works with the object of securing contracts for large tonnage, and being first in the field. The Association regard it as utterly unjustifiable, on such flimsy and uncertain grounds as they think exist, for collieries or factors to enter into new gas coal contracts at less than current prices, and that any such policy is likely to react in a very prejudicial manner both on coal owners and mine workers. A resolution was passed that very long contracts should not be entered into, and that prices should be maintained at the level justified by any new wages agreement.

MISCELLANEOUS NEWS.

GAS REGULATION ACT APPLICATIONS.

There have appeared in the "London Gazette" the following further notices with regard to applications to the Board of Trade for Orders under the Gas Regulation Act.

DECLARATIONS OF CALORIFIC VALUE.

Cheadle Rural District Council.—500 B.Th.U. (Jan. 1, 1924.)
Grays and Tilbury Gas Company.—425 B.Th.U. (March 25, 1924.)

BATH ELECTRICITY UNDERTAKING AND THE PUBLIC LIGHTING.

A Reply to "Journal" Comments.

At a meeting of the Bath City Council on Tuesday of last week consideration was given to a report by Mr. Francis Teague (the City Electrical Engineer) recommending the extension of the electrical generating plant, at an estimated cost of £80,000, to meet the further demand for current in the city. In the report, Mr. Teague stated that during the past year the increase had surpassed all previous records, and if it were maintained over the coming year, the capacity of the turbine plant installed would be inadequate to meet the demand in the winter of 1924. Opportunity was taken by Sir Harry Hatt, in moving the adoption of the report, to reply to some comments contained in an editorial on p. 498 of the "JOURNAL" for Nov. 21, under the heading of "Street Lighting Policy and Electricity Trading Illustrated by Bath." His remarks are reproduced from the "Bath and Wilts Chronicle."

Sir HARRY HATT said one naturally felt that the Council would be influenced to some extent by the confidence which they had in the Committee and in their reports; and it was simply in order to reassure the Council that he referred to an article which appeared in the "GAS JOURNAL" reflecting upon their decision as regarded the public lighting, and to which he would not have alluded except that it had been copied in the local Press. The "GAS JOURNAL" was, of course, a trade journal which concerned itself with the spread of gas—in that case poison gas. [Laughter.] It was a very long article, in which they were kind enough to devote a good deal of attention to himself. He passed over that. The only point he wanted to refer to was the very misleading statement—it looked as though it had been carefully calculated with that object—with regard to the charge that the Electricity Committee made for public lighting in Bath. The "GAS JOURNAL" referred to some reference which was made at the Council meeting in which this decision was come to; and in further reference it was stated that at Liverpool the ordinary price per therm for gas was 7·4d., and the charge for electricity for public lighting 3·3d. per unit, but at Bath the ordinary price for gas per therm was 5d., while the charge for electricity was 7d. per unit. This obviously conveyed the impression that they in Bath were charging 7d. per unit for the public lighting, when, as a matter of fact, they were charging 2·56d.—just over 2½d.—whereas in Liverpool they were charging 3·3d., so that they in Bath were really about ¾d. per unit below the price charged for public lighting in Liverpool. The fact that gas was 5d. per therm in Bath, as compared with 7·4d. in Liverpool, should draw the Surveying Committee's attention to the price paid in Bath to the Gas Company; and if it were discovered that the Gas Company were, as compared with the price charged in Liverpool, not giving the ratepayers full value of cheaper gas in Bath, then he had no doubt that a Company which had shown such a very great desire to save the pockets of the ratepayers would be only too pleased to readjust it.

Sir Harry said he was exceedingly sorry to have to bring forward at short notice so heavy an expenditure as that. It was always anticipated that they would have come to the Council for further borrowing powers. It was mentioned at this time last year, when they made their last application, that they would necessarily have to come for a new boiler, and probably for generating plant; but the business had developed so far beyond their anticipation that they were placed in the position that they must make an immediate move if they were to prepare for next year's load, and to a very much greater extent than they had anticipated. Briefly, he would say, with regard to the boiler capacity, if they reached 4000 KW. as their maximum load next year, reckoned at 16 lbs. of steam per KW., this meant they would require 64,000 lbs. of steam, and the total steaming capacity of the works at the present time was 44,000 lbs. This was when they had got everything in commission with no spares. It was obvious that they could not continue to go on in this way, and therefore they suggested the installation of two boilers of 25,000 lbs. capacity each, which would allow them sufficient margin for extensions, and would give efficient stand-by plant, which they really ought to have. With regard to the generating plant, at present they had, or would shortly have, in commission two 1500 KW. turbo-alternators; and it was obvious that if they were going to continue to effect economies which were brought about by the use of that generating system, they must have a stand-by for those alternators. They had got beyond the capacity; and if they reached 4000 KW. next year, they would then have to do what unfortunately they had been obliged to do this winter—fall back on their old plant. When they remembered that their friends "Darby and Joan" were considered obsolete twenty years ago, they would understand that they were running with some anxiety when they had to depend on them to carry them over the winter load.

What the Council would be concerned with was the financial result. But let him say that their business, of course, was very different from that of any private company or public company in this respect; and they could not be guided entirely by financial results. They were under obligation, by their Order, to supply current. It was possible that in times like this a private company or a private individual run-

ning a business might take the view that they were doing very well, and making very satisfactory profits; so why sink more capital in the undertaking? But the Corporation could not do so. There was no fear, humanly speaking, of them making any charge on the rates to meet increased capital and sinking fund charges. Last year they estimated a profit of £10,000, and the net profit, after paying all interest and sinking fund charges, was £12,200. Assuming that the charge for current remained as at present, they were estimating a net profit this year of £8517, in spite of the fact that they gave away over £9000 in reduced charges this year. They estimated for an increase of 1000 KW. per annum, and for each KW. of maximum demand they received a revenue of £22 16s. He had desired to take a very conservative estimate of the increase in the future. There was no special reason, but one liked to have an ample margin, so, instead of £22 16s., they had taken the increased revenue per KW. at £15—a very ample allowance to make for any eventualities. This meant an increased revenue of £15,000 a year. Their rate of profit was 20 p.ct., so this gave £3000 per year extra net profit. Sir Harry summarized the financial position as: A profit of £8517 in March, 1924; one of £8917 in 1925; and in 1926, £3915. In 1926 they would come upon their full capital charges. Having regard to the fact that when they reached their highest point of capital charges they were still sure of a substantial profit, they were able to give a very much better showing than they had ever had with regard to their expenditures in the past. They had estimated £100,000 expenditure up to 1926, because the £80,000 did not provide for the normal expenditure on capital account for mains and extensions, which worked out at something like £6000 a year. He had put this at another £20,000.

After a few questions had been asked and answered, the report was carried unanimously.

London County Council and Gas Charges.

Mr. Cyril Jacobs (Chairman of the Public Control Committee) stated at the London County Council meeting on Tuesday of last week that, following the recent inquiry held at the instance of the Council, the Board of Trade, in a letter received by the Council on Dec. 11, had intimated that they proposed to make an Amending Order under the Gas Regulation Act, 1920 [*ante*, p. 722], authorizing a standard price of 11d. a therm, in lieu of the existing 15s. 2d.—being a reduction of 4·2d. per therm. The decision must, however, not be taken as final, because, under the Act, the Board were required to consider any objection the Company might make to the proposed new standard price.

The Directors of Messrs. Gibbons (Dudley), Ltd., have declared the remaining 3½ p.ct. dividend upon the 7 p.ct. preference shares, and a second interim dividend of 3½ p.ct. upon the ordinary shares, both being payable, free of income-tax, on Jan. 1. The payment of a further dividend on the ordinary shares will be considered by the Directors when the final results of the year's trading are known.

THE NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

Owing to the holiday arrangements, it is only possible to report on the market up to Thursday this week. But there is not likely to be much change in the position between now and the Christmas break. "Half days" on 'change will be the rule throughout next week, and collieries and shippers alike have been completing their arrangements ahead all this week.

Tonnage has been arriving mostly up to time, and there has been considerable pressure to complete odd cargoes of coking. It is reported that up to 30s. f.o.b. has been paid for odd lots to complete; and the demand continues well into the new year. As much as 26s. is asked for good ordinary coking unscreened as far as February, and can probably be obtained.

Other classes of Durham unscreened remain strong in sympathy, and under the influence of satisfactory demand. Wear specials are now firmer at 25s. for forward, and best qualities are asking the same price, though they might be negotiable at a slightly lower figure. Seconds are 23s. to 24s., and gas coal collieries all consider that their position has distinctly improved during the last week or two, though there is still no great pressure to buy far ahead.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From a Local Correspondent.

There is the usual rush prior to the Christmas holidays of orders for coal in Yorkshire and Lancashire—a rush which may extend over the whole of next week. House coal is in keen demand. The better qualities are scarce, and secondary qualities are in request to a rather less degree.

There appears to be some improvement in the demand for industrial coals, and buyers generally anticipate an increase of price during the next few months. This probably accounts for the fact that many large industrial concerns are fixing contracts up to June 30.

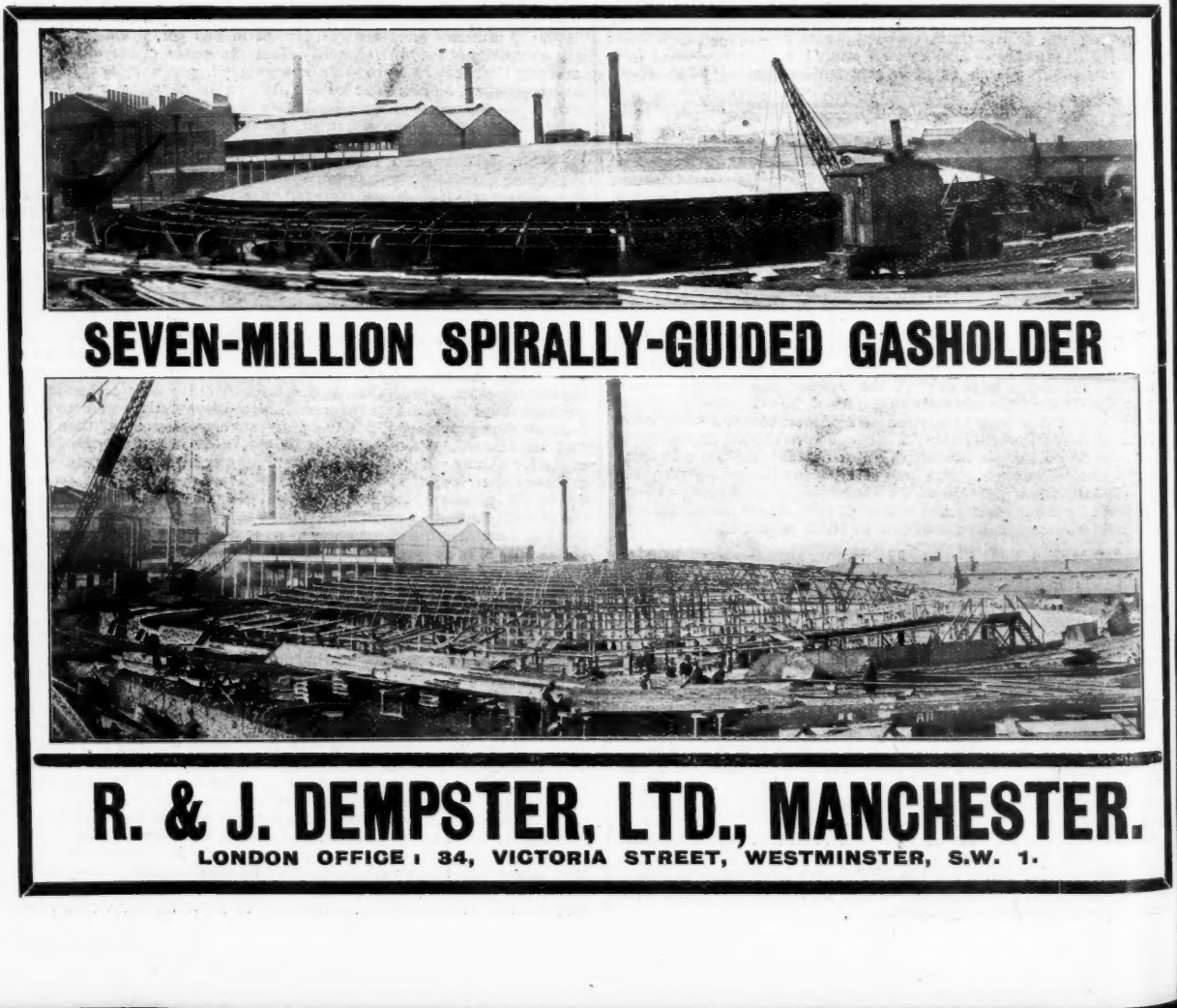
Gas companies are pressing for supplies to cover them for the holidays, and stocks are being accumulated to meet the difficulty.

The shipping market is rather quiet at the moment for forward business, possibly owing to the political situation here. Prices remain about normal; but furnace coke has somewhat advanced in value, following a sharp drop during the past month.

COAL TRADE IN THE MIDLANDS.

From our Local Correspondent.

The stringency has been greatly aggravated throughout the Midlands by the approach of Christmas. Prices have become very confused,


SEVEN-MILLION SPIRALLY-GUIDED GASHOLDER
R. & J. DEMPSTER, LTD., MANCHESTER.
LONDON OFFICE: 34, VICTORIA STREET, WESTMINSTER, S.W. 1.

STOCK MARKET REPORT.

THE depression in the Stock Market, which set in after the result of the General Election became known, continued last week. There was a resumption of selling of gilt-edged securities which was reflected in the other markets. As the week progressed there was rather less pressure to sell, and prices rallied slightly each day, but quotations were against holders at the close. The gloom which has settled upon markets is attributed to the exceptional parliamentary situation; and this has unnerved certain classes of investors. Fortunately, sterling exchange has been steady; there being very slight fluctuations on the week.

The Foreign Market was very idle. French issues were easier on the lower level of the franc.

Oil shares were well maintained. In the Miscellaneous Market, Tobaccos and Textiles received a fair measure of support.

In the Gas Market prices continued in the downward direction. Alliance and Dublin fell 2 points, to 60-65; British "A" 4, to 118-123; Commercial 3 p.ct. debenture and Gas Light and Coke 3 p.ct. debenture both dropped 1, to 57-62 *ex* div.; Gas Light and Coke ordinary fell 1, to 91-93; Imperial Continental 3, to 140-145; 3½ p.ct. debenture ½, to 75-77; South Metropolitan ordinary 1½, to 93-96, and 3 p.ct. debenture 2, to 58-63; European ½, to 7½-8½, Wandsworth "B" 4, to 112-117. Gas Light and Coke 4 p.ct. preference rose 1, to 76-79.

The following transactions were recorded on the London Stock Exchange up to the close of business on Wednesday last: On Monday, Brentford "A" 102⅝, 102¾, Cardiff 7½ p.ct. debenture 110¼, Gas Light and Coke 92, 92½, 92⅝, 4 p.ct. preference 75, Imperial Continental 3½ p.ct. debenture 75½, Liverpool 7 p.ct. preference 105½, Primitiva 5 p.ct. preference 21s. 3d., South Metropolitan 94½, 95, 95⅝, 95¼. Supplementary prices, Bournemouth 7 p.ct. debenture 105, 105½, Leatherhead 5 p.ct. 11½, 11½. On Tuesday, Alliance and Dublin 60, 63, Bournemouth 6 p.ct. preference 11 3/16, 11 5/16, Brentford "B" 102½, European 7⅜, 7 15/16, Gas Light and Coke 91½, 92¼, 92⅜, 92½, Imperial Continental 140, 142, Primitiva 5s. 6d., South Metropolitan 93, 94. Supplementary prices, Worthing 95. On Wednesday, Alliance and Dublin 62, Brentford "B" 101, 101½, Bristol 92½, 92⅝, 93½, Commercial 3½ p.ct. 95, 3 p.ct. debenture 57½, European 7½, Gas Light and Coke 91, 91½, 91⅞, 92, 4 p.ct. preference 75, 77, 78, 78½, 79, 3 p.ct. debenture 59, 60, *ex* div., Primitiva 5s. 6d., 5 p.ct. preference 21s. 3d., Tottenham "B" 101 1/16. Supplementary prices, Croydon 6 p.ct. debenture 102½, Southend 5 p.ct. "B" 90, 90½. On Thursday, Alliance and Dublin 61, Bournemouth 4 p.ct. debenture 80, Cape Town and District 4½ p.ct. debenture 75½, 76½, Gas Light and Coke 90½, 91, 91½, 91⅞, 92, 4 p.ct. preference 76½, 78, 3 p.ct. debenture 59 *ex* div., Imperial Continental 140, Primitiva 6s., 4 p.ct. (Buenos Aires) debenture 59½, South Metropolitan 93, 94, Tottenham "B" 100½.

Money was a little less plentiful as the week drew to a close. For fresh day-to-day loans 2 p.ct. down to 1½ p.ct. was paid. Accommodation over the New Year was secured at from 3 to 3½ p.ct. The new Treasury Bills were offered at 3½ p.ct. There was very little business in the discount market.

The Foreign Exchange Market was dull. A further fall in French francs was the principal event, and Thursday closed at 83.92-84.90. This constitutes a new low record. It is unfortunate that this should happen at the present time, as the prospect of a settlement of the reparations question has brightened since the appointment of the Expert Committee to investigate the German budget problem. The selection of the British representatives on this committee—Mr. Montagu Norman, Mr. Reginald McKenna, and Sir Josiah Stamp—will be generally commended.

The Bank rate is 4 p.ct., to which it was raised from 3 p.ct. on July 5. Bankers' deposit rates are 2 p.ct. The deposit rates of the discount houses are 2 p.ct. at call and 2½ p.ct. at notice.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S TRANSACTIONS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Divid. at Rate of	NAME.	Closing Prices, July 30, 1914.	Variation. Quotations, Dec. 20.	Variation. Lowest and Highest Prices of Transactions.
£			p.c.	% p.a.				
131,978	Stk.	Aug. 9	—	5	Aldershot 5 p.c. max. C.	..	72—77	...
227,992	,,	,,	—	4	Do. 4 p.c. Pref.	..	70—75	...
1,551,868	,,	Oct. 4	2½	5½	Alliance & Dublin Ord.	59—64	60—65	60—63
374,000	,,	July 12	4	4	Do. 4 p.c. Deb.	76—79	62—67	...
280,000	5	Oct. 18	7½	8	Bombay, Ltd.	5½—6½	5—5½	...
100,000	10	Aug. 9	16	8½	Bournemouth Gas and Water: 5 p.c.	..	12½—13½	...
					Bournemouth Gas and Water: B 7 p.c.	13—15½	11½—12½	...
383,110	10	,,	7	7	Bournemouth Gas and Water: Pref. 6 p.c.	13½—14	11—12	11 1/16—11 15/16
115,000	10	,,	6	6	Bournemouth Gas and Water: 4 p.c. Deb.	..	77—82	80
162,025	—	June 28	—	4	Do. A Ord. Stk.	154—159	127—132	...
992,045	Stk.	July 12	14	6 7/10	Brentford A Consolid.	261—266	100—105	102½—102⅝
734,920	,,	,,	11	6½	Do. B New	204—209	100—105	101—103½
55,000	,,	,,	5	5	Do. 5 p.c. Pref.	109—111	90—95	...
221,400	,,	Dec. 13	4	4	Do. 4 p.c. Deb.	91—93	76—81*	...
214,745	,,	Aug. 23	11	11½	Brighton & Hove Orig.	208—213	175—180	...
244,200	,,	,,	8	8½	Do. A Ord. Stk.	154—159	127—132	...
1,287,500	Stk.	July 26	5	5	Bristol 5 p.c. max.	..	95—96a	94½—93½
570,000	20	Oct. 4	12½	12	British A Ord.	44—45	118—123	...
100,000	10	June 28	—	7	Do. 7 p.c. Pref.	..	122—127	...
120,000	Stk.	,,	4	4	Do. 4 p.c. Deb. Stk	88—90	75—80	...
100,000	10	May 17	—	7	Cape Town & Dis., Ltd'	1½—2½	7—8	...
100,000	10	Oct. 31	—	4½	Do. 4½ p.c. Pref.	4—6	6—7	...
150,000	Stk.	June 28	—	4½	Do. 4½ p.c. Deb. Stk.	70—75	75—80	75½—76½
237,860	,,	,,	—	7½	Cardiff 7½ p.c. Deb.	..	108—113	110½
137,130	,,	Aug. 9	5	5	Chester 5 p.c. Ord.	108—110	85—90b	...
1,513,280	,,	July 26	5/9/4	6	Commercial 4 p.c. Stk.	106—108	95—98	...
560,000	,,	,,	5½	6	Do. 3½ p.c. do.	103—105	93—98	95
475,000	,,	Dec. 13	3	3	Do. 3 p.c. Deb. Stk.	69½—71½	57—62*	57½
800,000	,,	14 Jan. 15	4	—	Continental Union, Ltd.	76—79	32—37	...
200,000	,,	Dec. 13	7	7	Do. 7 p.c. Pref.	115—118	80—85*	...
660,000		Aug. 9	—	6½	Croydon sliding scale.	..	102—103	...
284,975		,,	—	5	Do. max. div.	..	85—88	...
492,270	Stk.	,,	6	4½	Derby Con. Stk.	123—125	107—110c	...
55,000	,,	—	4	4	Do. Deb. Stk.	102—104	74—76c	...
209,000	,,	—	—	5	East Hull 5 p.c. max.	..	..	...
1,902,180	10	July 12	10	5	European, Ltd.	17½—18	7⅞—8½	7¾—7½
16,546,120	Stk.	July 26	4/17/4	5½	Gas Light and Coke: 4 p.c. Ord	98—102	91—93	90¼—92½
2,600,000	,,	,,	3½	3½	Gas Light and Coke: 3½ p.c. max.	76—79	64—67	...
4,062,235	,,	,,	4	4	Gas Light and Coke: 4 p.c. Con. Pre.	96—99	76—79	75—79
4,761,930	,,	Dec. 13	3	3	Gas Light and Coke: 3 p.c. Con. Deb.	72½—74½	57—62*	59—60
130,000	,,	Dec. 11	10	10	Coke 10 p.c. Bonds	..	..	...
42,000	—	—	—	7½	Coke 7½ p.c. Ilford Deb.	..	..	...
82,500	,,	Sept. 19	5	6⅔	Hastings & St. L. 5 p.c.	..	93—98	...
858,740	,,	,,	3½	5⅓	Do. 3½ p.c.	87—89	78—83	...
70,000	10	Oct. 18	11	10	Hongkong & China, Ltd.	16½—16¾	16—17	...
86,600	Stk.	Aug. 23	9	9½	Hornsey 7 p.c.	..	144—149	...
1,976,000	,,	Nov. 15	9	5	Imperial Continental	150—160	140—145	140—142
401,400	,,	Aug. 9	3½	3½	Do. 3½ p.c. Deb. Red.	84—86	75—77	75½
235,242	,,	,,	6½	6½	Lea Bridge Ord. 5 p.c.	119—121	93—100	...
1,127,240	,,	Aug. 23	10	5½	Liverpool 5 p.c. Ord.	—	90—91b	...
600,000	,,	Sept. 19	—	7	Liverpool 7 p.c. Pref.	—	104—107b	105½
165,736	,,	Aug. 23	7/5/6	9	Maidstone 5 p.c.	—	125—130	...
63,480	,,	June 28	—	—	Do. 5 p.c. Deb	..	55—60	...
75,000	5	Dec. 13	6	5	Malta & Mediterranean Met. of Melbourne 4½ p.c. Deb.	4½—4¾	3⅜—3½*	...
50,000	100	Oct. 1	4½	4½		99—101	95—98	...
541,920	Stk.	Nov. 29	4	4	Montevideo, Ltd.	11½—12	48—53	...
1,875,892	,,	July 20	4½	4½	Newcastle & Gatsh'dCon.	98½—99½	86—87d	...
850,166	,,	Aug. 9	—	4	Do. 4 p.c. Pref. Stk.	..	74½—76½d	...
149,705	,,	June 28	3½	3½	Do. 3½ p.c. Deb.	82—83	73—74d	...
15,000	10	Aug. 23	—	11	North Middlesex 10 p.c.	..	16½—17½	...
75,940	10	,,	7/14/0	7 7/10	Oriental, Ltd. 7 p.c.	14—15	11½—12½	...
300,000	Stk.	Nov. 29	8	9	Oriental, Ltd.	117—122	97—102	...
138,120	Stk.	June 28	—	7½	Plym'th & Stonh'se 5 p.c.	—	108—113	...
60,000	50	Sept. 6	13	13	Portsea Island, B	128—131	105—110	...
100,000	50	,,	12	12	Do. C	118—121	100—105	...
1,450,145	5	29 Oct. 14	8	—	Primitiva Ord.	5½—6	½—½	5/6—6/-
1,199,800	5	30 Dec. 15	5	—	Do. 5 p.c. Pref.	4½—5	1½—1¾	21/3
341,400	100	Dec. 3	4	4	Do. 4 p.c. Deb.	91—93	70—75	...
600,000	Stk.	July 26	4	4	Do. ,, ,, 1911	—	55—58	...
120,935	,,	June 28	4	4	Do. B. Aires 4 p.c. Deb.	85—87	56—59	...
321,670	,,	,,	4	4	Do. Riv. Pl. 4 p.c. Deb.	85—87	56—59	59½
150,000	10	Oct. 4	6	6	San Paulo 6 p.c. Pref.	10½—11	5¼—6	...
125,000	50	July 2	5	5	San Paulo 5 p.c. Deb.	47—49	38—41	...
270,000	Stk.	Aug. 23	10	5	Sheffield A	223—224	100—102e	...
419,968	,,	,,	10	5	Do. B	222—224	100—102e	...
1,047,000	,,	,,	10		Do. C	220—222	100—102e	...
133,201	Stk.	—	4		Shrewsbury 5 p.c.	—	..	...
90,000	10	Oct. 18	9	6	South African	10½—11½	7—9	...
1,609,895	Stk.	July 26	5/9/4	5	South Met. Ord.	111—113	93—96	93—95⅛
250,000	,,	July 12	—	5	Do. Red. Pref.	..	98—100	...
1,895,445	,,	,,	3	3	Do. 3 p.c. Deb.	74½—74¾	58—63	...
734,000	,,	Sept. 6	—	6½	Do. 6½ p.c. Deb.	..	105—107	...
91,500	,,	Aug. 23	8½	8½	South Shields Con. Stk.	157—159	134—136d	...
1,087,795	,,	,,	6	6	S'th Suburb'n Ord. 5 p.c.	114—116	99—102	...
368,837	,,	June 28	5	5	Do. 5 p.c. Deb. Stk.	116—118	97—102	...
647,740	,,	Nov. 15	5	5	S'th'mpt'n Ord. 5p.c. max	99—102	85—90	...
121,275	,,	June 28	4	4	Do. 4 p.c. Deb. Stk.	..	76—81	...
250,000	,,	Aug. 23	—	7	Swansea 7 p.c. Pref. Stk.	..	102—104	..
200,000	,,	June 28	—	6½	Do. 6½ p.c. Deb. Stk.	..	105—107	...
120,000	,,	July 26	—	8	Tottenham A 5 p.c.	135—138	122—127	..
782,275	,,	,,	6	6½	Tottenham B 3½ p.c.	115—117	100—105	100½—101 1/16
181,255	,,	Dec. 13	4	4	Tottenham District 4 p.c. Deb.	87—89	77—81*	...
258,251	Stk.	Aug. 23	3	5	Tynemouth 5 p.c. max.	108½—109	89—91d	...
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	July 12	8½	9	Wandsworth A 5 p.c.	151—156	140—145	...
255,636	,,	,,	6½	7½	Do. B 3½ p.c.	129—134	112—117	...
108,075	,,	,,	5/17/3	6 3/10	Do. C.	110—115	100—105	...
140,865	,,	,,	—	6 3/10	New Ordinary	..	..	...
352,000	,,	,,	6½	7½	Wimbledon 5 p.c.	117—122	110—115	...
98,000	,,	,,	6½	7½	Epsom 5 p.c.	121—126	118—123	...
88,426	,,	June 28	3	3	5 p.c Deb. Stk.	66—69	57—60	...

Quotations at:—a.—Bristol. b.—Liverpool. c.—Nottingham. d.—Newcastle. e.—Sheffield. * Ex div.

DESIGN and CONSTRUCTION
OF A
12½ MILLION GASHOLDER
By R. J. MILBOURNE,
Assoc.M.Inst.C.E., F.C.S

The work comprised in the pages of this Book was first published as a series of articles in the "GAS JOURNAL," when it met with so much appreciation from the gas engineering fraternity that it was thought advisable to embody it in its present handy form.

Size 7 in. by 9 in., Bound in Cloth, Gilt Lettered with numerous illustrations in the text, and seven double-page plates.

Price **7s. 6d.**

Walter King, Ltd., "Gas Journal" Offices, 11, Bolt Court, Fleet Street, London, E.C. 4.

inasmuch as alterations have been so frequent in the case of some of the pits that distributors hardly know from one day to another where they are. The accepted practice is that when advances are made they should not apply to orders already placed but unexecuted. Factors complain bitterly that the principle is being violated in a considerable number of cases. However, the prevailing tension is due more to disorganized transport than to any action or inaction at the pits. Collieries are working steadily and well as far as the supply of wagons enables them to do so. But delays in transit, owing to unfavourable weather and the congestion of the Christmas trade, are very serious. Gas engineers are pressing for deliveries as arrears increase, and in all other departments of the market there is a shortage which can hardly be overcome yet awhile with the best will in the world. People are talking again of a coke famine. Gas coke is unobtainable for early delivery, and furnace coke is in such short supply that for new business 2s. to 4s. is demanded above the 24s. at ovens arranged between the cokeries and Midland furnacemen. Plans for re-starting idle pig-iron plants are being suspended.

Stream-Line Filter Company, Ltd.—A private Company has been issued under this title, with a capital of £72,000, in £1 shares (20,000 7½ p.ct. cumulative preference). The offices are at No. 64, Victoria Street, Westminster, S.W.

Redcar Gas Undertaking.—When an increase in the Town Clerk's salary was under discussion at a meeting of the Redcar Town Council, Alderman Hill said the Clerk had saved the town thousands of pounds in connection with the gas and other undertakings. The increase was agreed to. The Corporation also decided to offer the work of erecting a new gasholder, of a capacity of 500,000 c.ft., to the Furness Shipbuilding Company, Haverton Hill-on-Tees, provided they enter into a contract at a sum not exceeding £10,500.

Bathroom Fatality at Bournemouth.—An inquiry was held by the Bournemouth Borough Coroner (Mr. F. G. Lefroy) and a jury last Wednesday, into the circumstances attending the deaths of Mr. and Mrs. H. A. Collier, whose bodies were found in the bathroom of their flat, where warm water was flowing from the geyser, and there was a general smell of escaping gas. It was surmised that Mrs. Collier's long stay in the room must have alarmed her husband, who, on going to ascertain the cause, was also overcome. Medical evidence was to the effect that death was due to asphyxia following coal-gas poisoning, and a jury returned a verdict of accidental death from this cause. A correspondent writes that a geyser was fixed about a year ago by a local man; and so far as it had been possible to make subsequent examination, everything was in order. The flue, however, was not of the type adopted by the Gas Company, and the room had no separate ventilator. There was a good deal of gas about, and the suggestion put forward was that a light declared to have been seen under the geyser was the pilot light, which had not been sufficiently pushed home to light the main burner. Possibly someone put a further coin into the meter, and so the escape of gas continued.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *Dec.* 20.

The market for pitch is quiet, and in the absence of business prices continue to be talked down to about 100s. per ton; but this figure is purely nominal. Creosote is in strong demand, and the market is firm at from 10d. to 10½d. per gallon, net and naked at makers' works. Solvent naphtha is quiet at about 1s. 6d. per gallon for 95/160 quality. Pure benzole is about 1s. 6d. per gallon, and pure toluole about 1s. 9d. per gallon. Pyridine bases is firm at 20s. to 22s. 6d. per gallon. Other products are without alteration.

Tar Products in the Provinces.

Dec. 21.

There is little alteration in the markets for tar products, except that there has been more inquiry for pitch; and no doubt we shall see an improvement in this article immediately after the holidays. It is thought that a good many of the orders have recently been on a bare account, and there is still a considerable quantity to be purchased for January-April delivery. Creosote remains very firm.

The average values for gas-works products during last week were: Gas-works coal tar, 66s. 6d. to 71s. 6d. Pitch, East Coast, 97s. 6d. to 100s. f.o.b. West Coast—Manchester, 92s. 6d. to 95s.; Liverpool, 93s. 6d. to 96s.; Clyde, 94s. 6d. to 97s. Benzole 90 p.ct., North, 1s. 0½d. to 1s. 1d.; crude 65 p.ct. at 120° C., 9½d. to 10d. naked at makers' works; 50-90 p.ct., naked, North, 1s. 5d. to 1s. 7d. Toluole, naked, North, 1s. 5d. to 1s. 7d., nominal. Coal tar crude naphtha in bulk, North, 7½d. to 8½d. Solvent naphtha, naked, North, 1s. 2½d. to 1s. 4d. Heavy naphtha, North, 1s. 5½d. to 1s. 7½d. Creosote, in bulk, North, liquid, 8⅞d. to 9d.; salty, 8½d. to 8⅞d.; Scotland, 8d. to 8¼d. Heavy oils, in bulk, North, 9d. to 9½d. Carbolic acid, 60 p.ct., 3s. to 3s. 2d. prompt. Naphthalene, £15 to £16; salts, £6 to £8, bags included. Anthracene, "A" quality, 4d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

The first steps are being taken to establish a meter testing station in Belfast. At present the meters have to be sent to Manchester, Glasgow, or Dublin.

Shortly after 5 o'clock on Dec. 18, electrically-lighted shops and streets in Poplar were suddenly plunged in darkness, owing to the temporary failure of the current at the power station of the Poplar Borough Council Electricity Department. The trouble was stated to be due to the fusing of a cable, and was put right in about twenty minutes.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON TUESDAY, to ensure insertion in the following day's issue.

Orders to Alter or Stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Monday.

UNDISPLAYED ADVERTISEMENTS; Situations Wanted, Six Lines and under (about 36 words) 3s.; each additional Line, 6d. Situations Vacant, Apparatus Wanted and for Sale, Contracts, Public Notices, &c., 9d. per Line—minimum, 4s. 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

		One Year.	Half-Year.	Quarter.
United Kingdom	Advance Rate:	35/-	18/-	10/-
	Credit Rate:	40/-	21/-	11/6
Abroad (in the Postal Union) Payable in Advance		40/-	22/6	12/6

In payment of subscriptions for "JOURNALS" sent abroad, Post Office Orders or Bankers' Drafts on London only are accepted.

All Communications, Remittances, &c., to be addressed to WALTER KING, LIMITED, 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4.

Telegrams: "GASKING, FLEET LONDON." Telephone: Holborn 6857.

OXIDE OF IRON

FOR SALE OUTRIGHT, OR ON LOAN.

SPENT OXIDE

PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LTD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.2.

"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for Gas-Works.
ANDREW STEPHENSON, Gresham House, Old Broad Street, LONDON, E.C. "Volcanism, London."

TULLY GAS PLANTS, LTD.,
40, NORFOLK ST., STRAND, LONDON, W.C. 2.
SOLE Makers of Tully's Patent Gasification Plant. Specialists in Tar Extractors, Coal Elevators and Conveyors, Hoppers, Bunkers, T.G.P. Fire Cement, Castings.
Telegraphic Address: "DAMPER, ESTRAND, LONDON." Telephone: CITY 4047-8 (Two lines).

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E. 1.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams—"BRADDOCK, OLDHAM," and "METRIQUE, LAMB, LONDON."

WE Specialize in Small Gas-Works and Solicit Inquiries for COMPLETE WORKS, EXTENSIONS, and RENEWALS.
Penney & Porter (Engineers), Ltd., LINCOLN.
Established 1855.
Telegrams: Porter, Lincoln. Telephones: 266 & 211.

MEWBURN, ELLIS, & CO.,
CHARTERED PATENT AGENTS AND TRADE MARK AGENTS,
70 & 72, Chancery Lane, London, W.C.2.
Telegrams: "Patent, London." Phone 243 Holborn.
And 8, St. Nicholas Buildings, Newcastle-on-Tyne.

OXIDE OF IRON.
SPENT OXIDE BOUGHT.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C.3.
Phone: Minories 1484.

"TORTO" FIRE CEMENT.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C.3.
Phone: Minories 1484.

"KLEENOFF," THE COOKER CLEANSER.
Tins for Sale to Consumers.
In Bulk for Works Use.
BALE & CHURCH, LTD.,
33, ST. MARY AT HILL, LONDON, E.C.3.
Phone: Minories 1484.

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in connection with Sulphate Plants.
We Guarantee promptness with efficiency for Repairs.
JOSEPH TAYLOR (SATURATORS), LTD., Chemical Plant Engineers, Blackhorse Street Mills, BOLTON.
Telegrams—"SATURATORS, BOLTON." Telephone 848.

GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CLXIV. No. 3163.] LONDON, DECEMBER 26, 1923. [75TH YEAR. PRICE 1s.

COAL TAR PITCH

OF

BEST AND UNVARYING QUALITY.

REFINED TAR.

CREOSOTE, ANTHRACENE AND CARBOLIC OILS. NAPHTHALENES.

BENZOL PRODUCTS:

Pure, 90's and Standard Benzol. — Pure and Commercial Toluol. — Light and Heavy Solvents.
65 per cent. Crude Benzol.

MOTOR BENZOL.

SULPHATE OF AMMONIA.

CONCENTRATED AMMONIA. **MURIATE OF AMMONIA.**

SIMON-CARVES LTD., MANCHESTER.

Telegrams:—"SIMCAR, MANCHESTER." Telephone:—8200 CITY (8 lines).

BOOSTING PLANT.

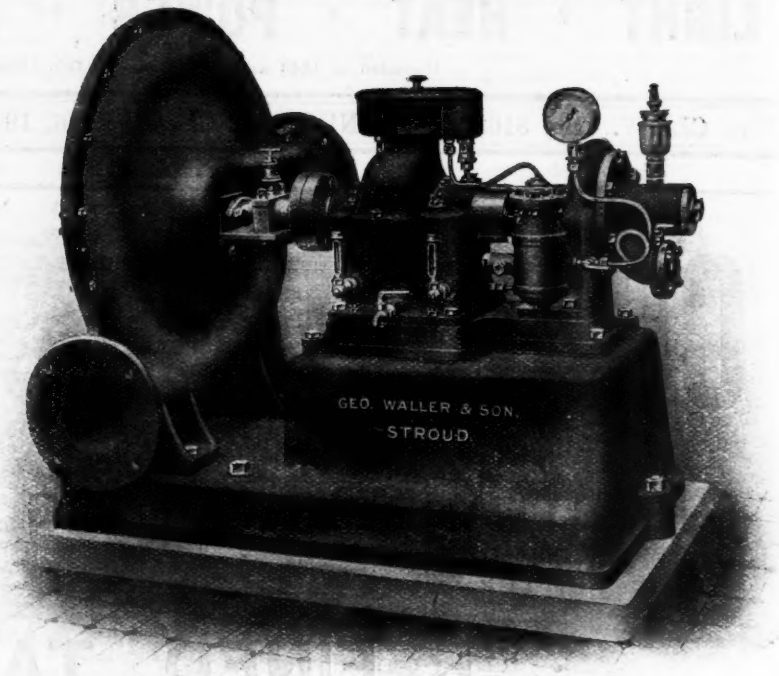
FOR INCREASING
DISTRICT PRESSURES.

ALL CAPACITIES.

STEAM TURBO,
ELECTRIC,
GAS ENGINE or
BELT DRIVE.

Send us your enquiries and we will submit proposals.

For our other Specialities see S.B.G.I. Directory.



GEO. WALLER & SON, LTD., PHŒNIX IRON WORKS, STROUD, GLOS.

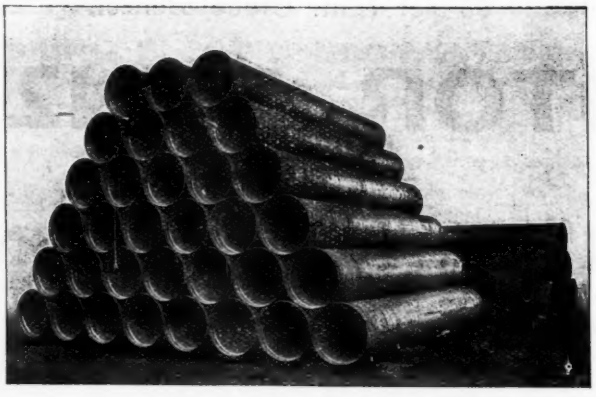
Telegrams: "WALLER, BRIMSCOMBE." Telephone: 10 BRIMSCOMBE.
LONDON OFFICE: 149-150, PALACE CHAMBERS, S.W.1. Telephone: 9476 VICTORIA.
Agents for Scotland. D. M. NELSON & CO., 20, West Campbell Street, GLASGOW.

STEEL PIPES WELDED & RIVETTED.

For GAS, WATER & OTHER PURPOSES.

With Socketted, Flanged or other Type Joints.

DIMENSIONS SUPPLIED ARE 14" DIAMETER AND UPWARDS, AND LENGTH 18 TO 26 FEET.



Advantage over Cast Iron Pipes: Saving in Cost of Transport and Laying, owing to less Joints, and in Repairs as unaffected by Variations in Temperatures.

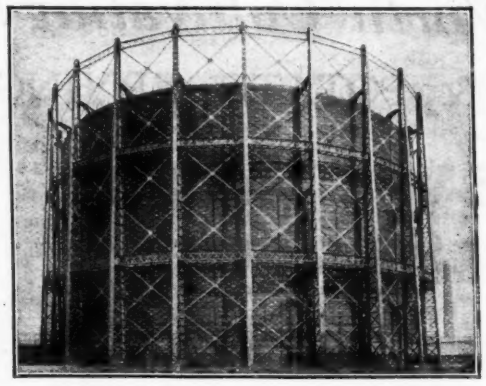
Steel Pipes supplied to Vancouver Gas Co.

SEND YOUR ENQUIRIES TO

THOMAS PIGGOTT & CO., Limited,

SPRING HILL, BIRMINGHAM.

Telegrams: "Atlas, Birmingham." Telephone: 3922 Central. LONDON OFFICE: 63, QUEEN VICTORIA ST., E.C.4.

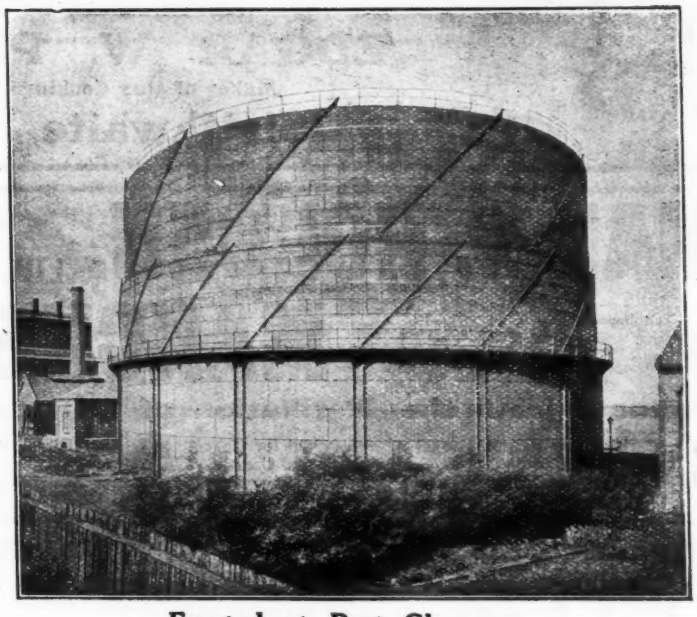


GASHOLDERS and TANKS
of any size or type.

CONDENSERS—Water Tube,
Annular or Open Atmospheric.

TOWER SCRUBBERS.

PURIFIERS—Water or Dry Lute
Cast Iron or Ferro-Concrete Boxes.

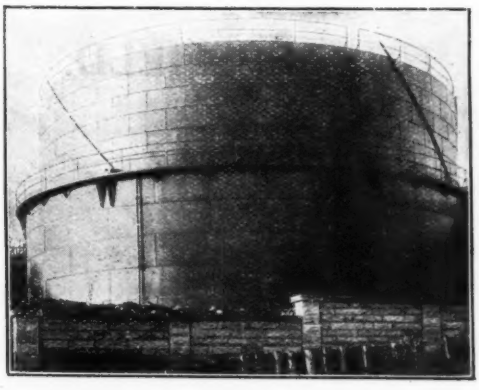


Erected at Port Glasgow.

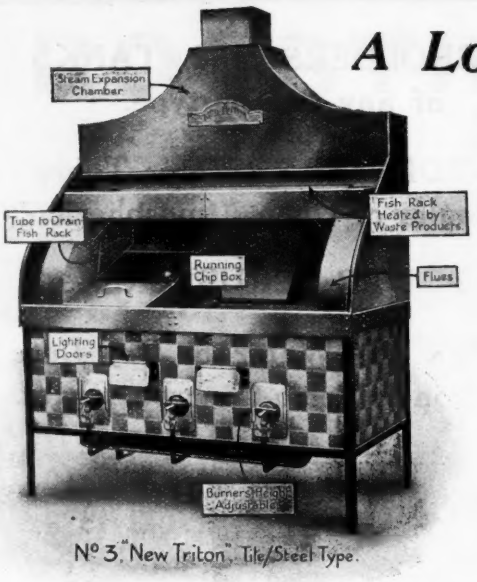
OIL and CHEMICAL WORKS
PLANT.

STRUCTURAL WORK of every
description.

STEEL RIVETTED PIPES.



THE BARROWFIELD IRON-WORKS, LTD.,
GAS ENGINEERS AND CONTRACTORS,
Telegrams: "GASOMETER GLASGOW." GLASGOW.
London Office: 6, LITTLE BUSH LANE, CANNON STREET, E.C. 2.



No 3. "New Triton" Tile/Steel Type.

A Load Worth Cultivating!

FISH & POTATO FRYING

by the

"NEW TRITON"

Gas Range.

See Article in the "GAS SALESMAN" for March pp. 40 & 41.

Full Particulars from

EDGAR W. PROCTER,

Maker of Gas Cooking Appliances.

Slaithwaite, Yorks.

HARDMAN & HOLDEN, LTD., MANCHESTER.

Telegraphic Addresses:
"BENZOLE, MANCHESTER."
"OXIDE, MANCHESTER."

Telephones:
Manchester—Miles Platting and Clayton } City 9666 (8 lines). Oxide, 5888 Central Manchester.

All Bye-Products from the Distillation of Coal dealt with.

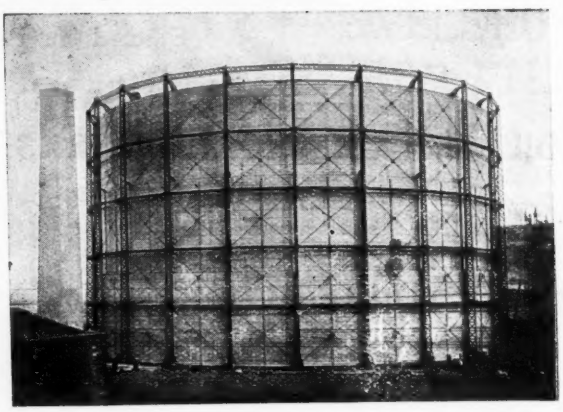
SPECIALITIES Carburetting Benzol, Benzol Absorbing Oil for Coke-Oven Plants, Toluol, Solvent, Heavy, and Burning Naphthas, Pyridine Bases, Carbolic Acid and Cresylic Acid, Soluble Disinfecting Fluid, Creosote, Fuel and Lucigen Oils, Black Varnish, Dipping Blacks, Prepared Tar for Asphalting, and for Road Treatment, *See our Advertisement next week.*

W. C. HOLMES & CO., LTD.,

ENGINEERS,

HUDDERSFIELD.

Telegrams:
"Holmes, Huddersfield."
Telephone:
Huddersfield 1573.



Gasholder erected at Huddersfield, 1914.
(Capacity 4½ Million Cub. Ft.)

Manufacturers of complete installations for

GASWORKS, COKE OVENS, and BY-PRODUCT PLANTS.

ENQUIRIES INVITED.

ACKROYD & BEST, LTD., MORLEY, nr. LEEDS.

(Works cover 4½ Acres.)

Actual Makers of—

GLASSWARE—Clear, Opal, or Coloured—for all lighting purposes.
STAMPINGS AND PRESSINGS in all Metals.
COINS, MEDALS, TOKENS, &c.
LAMPS (Oil, Spirit, and Acetylene) for Mines, Quarries, Railways, Engineers, &c.
SPECIAL FURNACE CEMENT for Repairing and Rebuilding Furnaces, Coke Ovens.

THE
"SIMPLEX"
WATER GAS PLANT

(Incorporating the "Sydenham" Grate)

BLUE & CARBURETTED.

SPECIALLY SUITABLE FOR SMALL & MEDIUM-SIZED WORKS.

NO OIL REQUIRED FOR ENRICHMENT.
EFFECTIVE.
SIMPLE TO OPERATE.
LOW COST.
NO CLINKERING.

THE
Vertical Gas Retort Syndicate LTD.
17, VICTORIA STREET, WESTMINSTER, S.W. 1.
Telegraphic Address - "VERTIGARET, VIC, LONDON."

JOHN BROWN & CO., LTD., Colliery Offices: ROUNDWOOD, Nr. ROTHERHAM.

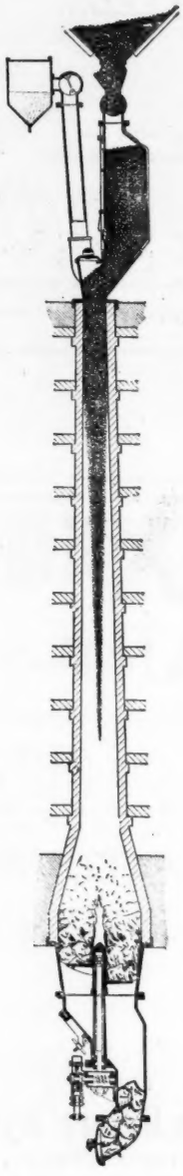
OWNERS OF THE FAMOUS

Aldwarke, Rotherham, & Dalton Main Gas Coals

As used by the principal Gas Companies of the World.

ALSO PRODUCERS OF THE BEST SOUTH YORKSHIRE ASSOCIATED HARDS (BARNSLEY BED).

TELEGRAPHIC ADDRESS: "ROUNDWOOD, ROTHERHAM." TELEPHONE: ROTHERHAM 226.



Glover-West Vertical Retorts

for

DURHAM COALS

	CUBIC FEET PER DAY.
NEWCASTLE-UPON-TYNE	
1st Contract 1911, 2nd Contract 1913	5,500,000
DARLINGTON	
1st Contract 1912, 2nd Contract 1923	3,000,000
GOTHENBURG	
1st Contract 1912, 2nd Contract 1919	2,500,000
BERGEN - - 1911	750,000
BLYTH - - - 1914	1,000,000
COPENHAGEN - 1921	3,000,000

These Installations carbonize annually over 300,000 Tons of Durham Coals.

WEST'S GAS IMPROVEMENT CO. LTD.

ENGINEERS, MILES PLATTING

Telephone :— CENTRAL 5961 (3 lines)

MANCHESTER

Telegraphic Address :— "STOKER, MANCHESTER"

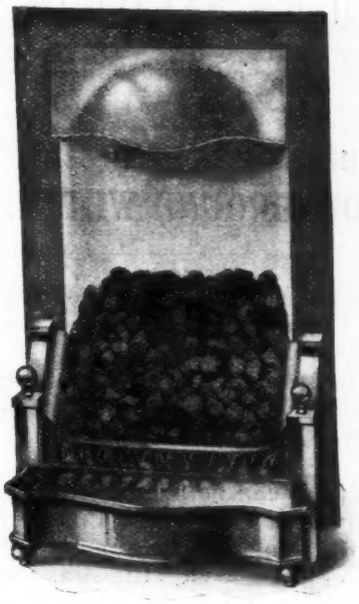
LONDON
Regent House, Kingsway, W.C.2
Telegraphic Address :— "IMVERTRET, WESTCENT, LONDON"
*Telephone :—*REGENT 387

NEW YORK (U.S.A.)
WEST GAS IMPROVEMENT Co. OF AMERICA
Incorporated
150, Nassau Street, New York
Telegraphic Address :—"VERTICALS, NEW YORK"
*Telephone :—*BEEKMAN 1420

SYDNEY
Union House, 243, George Street, Sydney, N.S.W.
Telegraphic Address :—"VERTICAL, SYDNEY"

PARIS
CIE. GLE. DE CONSTRUCTION DE FOURS
8, Place des Etats-Unis, MONTROUGE (Seine)
Telegraphic Address :—" CORMIQUES-MONTROUGE (SEINE)"
*Telephone :—*SÉGUR 92-63 & 92-64

How the "Cinderella" helps you



A SIMPLE method of increasing your gas sales is to instal the "Cinderella" gas fire in your district. Of all advocates for the use of gas for heating, the "Cinderella" is the finest. It is a gas salesman that never fails to persuade and to convince. Its inviting appearance and warmth are so marked that everybody who sees the "Cinderella" immediately wants one. This means repeat orders for you and an increase in the gas consumption in your district.

You are continually working hard to increase your sales. Let the "Cinderella" help you to accomplish your object with less labour.

The fire that makes gas sales grow.

LONDON
Showrooms:
38, Grosvenor Gardens, S.W.1.
Tel.: Victoria 4140.

R. & A. MAIN Ltd.
GOTHIC WORKS,
LONDON and FALKIRK.

GLASGOW
Office and Showrooms:
82, Gordon St.
Tel.: Central 1749

Alder & Mackay, Ltd.

Established 1850.

Manufacturers of Green's Patent UNDERGROUND WET METER.

Especially suitable for measuring STREET LAMP consumption.

ALSO for Market Stances and Residential Houses where these may be a long way from the Main Pipe.

This Meter can be fixed at any convenient point close to the Main Pipe, and in the case of a long service supply any leakage taking place in it, the gas would be measured as it left the Main Pipe.

This METER is always fixed outside; therefore in case of FIRE it is always accessible.

MADE IN SIZES FROM 3 LIGHTS TO 100 LIGHTS

All particulars on application.

New Grange Works, EDINBURGH.

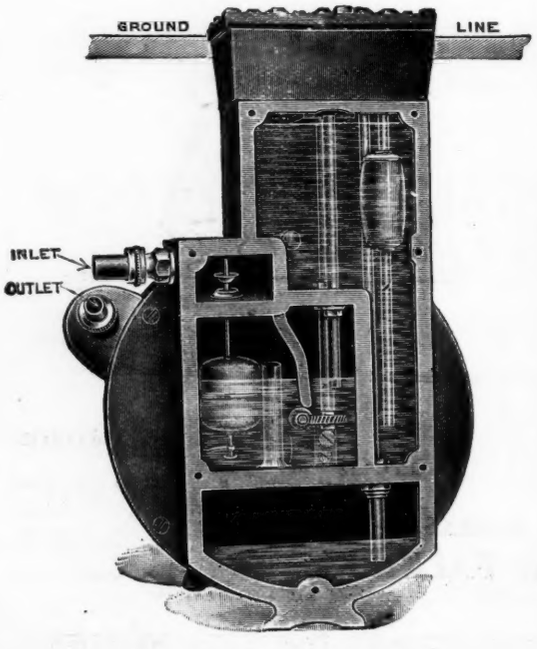
LONDON
Douglas Street Works, Westminster, S.W.

BRADFORD
Ventnor Street Works.

BIRMINGHAM
Central House, New St.

SYDNEY, N.S.W.
12, Bridge St.

WELLINGTON, N.Z.
Lower Taranaki St.



SERCK

TESTED TUBES IN BRASS, COPPER, NICKEL SILVER, AND ALUMINIUM.

The highly specialized processes in the manufacture of Serck Tubes combine in an unusual degree the essential qualities of lightness and durability. Every tube is thoroughly tested at all stages of production, and the finished tube can be depended upon to give the maximum of service under any conditions of heat or cold. Over 100 draw benches are engaged in drawing Brass, Copper, Nickel Silver, and Aluminium Tubes in lengths to 20 ft., and ganges from 18 s.w.g. to a few thousandths of an inch.

Send us your enquiry. Quotation by return.

SERCK TUBES, LIMITED,
Warwick Rd., Greet, BIRMINGHAM.
Telephone: Victoria 531 (3 lines).
Telegrams: "Nerleak, Birmingham."
BRANCH FACTORIES AT LONDON, CARDIFF, CHESTER, MANCHESTER, NEWCASTLE, and SUDBURY (SUFFOLK).

Send to Serck

H.P.

GAS FURNACES

for

ALL INDUSTRIAL PURPOSES

FOR

Low Gas Consumption,
Scientific Construction,
Ease of Control,
Correct Atmosphere,
Radiant Heating,
AND

ENTIRE SATISFACTION

USE

"SURFACE COMBUSTION" FURNACES.

BRITISH FURNACES, LTD.,
DERBY RD., CHESTERFIELD.

Telephone: 84. Telegrams: "British Furnaces, Chesterfield."

CCCL

A Revelation in Slot Meter Collection

The enormous attraction and interest aroused by the demonstration of the Coin-Change Company's Attachment at the recent National Gas Exhibition at Bingley Hall, Birmingham, proved how great was the need for such a boon. Leading Gas Engineers and experts from all over the country were emphatic and unanimous in their expressions of approval.

The

CHANGE-GIVING METER ATTACHMENT

helps the consumer to a freer use of his gas and his money, and solves many a troublesome problem of collection for the companies. Simple in use, strong in construction, easily attachable to all types of meters, and guaranteed for years of wear. It already has been fully tested by the leading Gas Companies in the country.

Note the enormous saving in collection.

Send for full details and a copy of the leaflet "A Chat on Change."

THE COIN-CHANGE COMPANY, LTD.

Trinity Works, Montague Road, Hounslow, Middlesex.

(Telephone: Hounslow 171.)

All communications to Registered Offices: **16, Lebanon Park, Twickenham, Middlesex.**

(Telephone: Richmond 1792.)

CCCL

SILICA AND SILCO RETORTS.

"S.P. SILICA" 95 % RETORTS AND FOR BYE PRODUCT COKE OVENS.

"SILCO" RETORTS 90 % SILICA.

MINIMUM EXPANSION

THE OUGHTIBRIDGE SILICA FIREBRICK COMPANY, LIMITED.

OUGHTIBRIDGE, Near SHEFFIELD.

ESTABLISHED 1858.

Plastic Silica Cement.

Silco Cement AND Ground Ganister.

Highest Grade Silica Bricks and Blocks for Gas Works.

TULLY GAS PLANTS

Orders Received and Plants Erected since 1919.

		Cubic ft. per 24 hrs.
RUNCORN	1 Set	300,000
HOLYHEAD	1 "	100,000
NEWARK	1 "	300,000
HONLEY	1 "	150,000
EAST GRINSTEAD	1 "	200,000
SANDOWN	1 "	100,000
CRANTHAM	1 "	300,000
HEYWOOD	1 "	300,000
NORMANTON	1 "	100,000
NORMANTON	1 "	100,000
ENNISKILLEN	1 "	50,000
LLANDUDNO	1 "	300,000
SWADLINCOTE	1 "	200,000
IRTHLINGBOROUGH	1 "	100,000
KNOTTINGLEY	1 "	100,000
NEWCASTLE, STAFFS.	1 "	300,000
CONWAY	1 "	100,000
BURNHAM	1 "	75,000
BURNTISLAND	1 "	200,000
BRIDGEND	1 "	100,000
LIMERICK	1 "	300,000
COLWYN BAY	1 "	300,000
CARMARTHEN	1 "	100,000
KIRKBY-IN-ASHFIELD	1 "	100,000
KELSO	1 "	100,000
OTLEY	1 "	100,000
BLANDFORD	1 "	100,000
GRANGE & CARTMEL	1 "	100,000
TIVERTON	1 "	100,000
FORMBY	1 "	100,000
KIDDERMINSTER	1 "	300,000
KIDDERMINSTER	1 "	300,000
TONBRIDGE	1 "	500,000
LARNE	1 "	100,000
KELTY	1 "	150,000
HORLEY	1 "	150,000
EAST DEREHAM	1 "	100,000
ABERYSTWYTH	1 "	200,000
HARPENDEN	1 "	300,000
KILDWICK	1 "	200,000
HASLEMERE	1 "	150,000
SOUTHBANK	1 "	300,000
MIRFIELD	1 "	300,000
WHITBY	1 "	300,000
FEATHERSTONE	1 "	100,000
FEATHERSTONE	1 "	100,000
GUERNSEY — repeat order	1 "	500,000
THIRSK	1 "	100,000
NEWARK — repeat order	1 "	300,000
LLANDUDNO — repeat order	1 "	300,000
HEXHAM	1 "	150,000
HEXHAM	1 "	150,000
SELBY	1 "	150,000
SELBY	1 "	150,000
WELLINGTON (SALOP)	1 "	200,000
PORTHCAWL	1 "	200,000
TEIGNMOUTH	1 "	200,000
LETCHWORTH	1 "	300,000
LETCHWORTH	1 "	300,000
COLWYN BAY — repeat order	1 "	300,000
WHITSTABLE	1 "	100,000
JERSEY — repeat order	1 "	300,000
DURSLEY	1 "	150,000
DURSLEY	1 "	150,000
CIRENCESTER	1 "	100,000
CORING-ON-THAMES	1 "	75,000
CASTLEFORD	1 "	300,000
HAVERTON HILL-ON-TEES	1 "	100,000
HAVERTON HILL-ON-TEES	1 "	100,000
BATLEY	1 "	300,000
BATLEY	1 "	300,000
HASLINGDEN	1 "	200,000
OSSETT	1 "	300,000
SEATON	1 "	75,000
SEATON	1 "	75,000
TAYPORT	1 "	75,000
RYDE, ISLE OF WIGHT	1 "	150,000
RYDE, ISLE OF WIGHT	1 "	150,000
KNOTTINGLEY — repeat order	1 "	100,000
NEWQUAY	1 "	75,000
NEWQUAY	1 "	75,000
PONTEFRACT	1 "	200,000
PONTEFRACT	1 "	200,000
CONCLETON	1 "	200,000
CORDOBA, SPAIN	1 "	200,000
REUS, SPAIN	1 "	100,000
KOBE, JAPAN	1 "	500,000
KOBE, JAPAN	1 "	500,000
KOBE, JAPAN — repeat order	1 "	50,000
KOBE, JAPAN	1 "	50,000
KOBE, JAPAN — repeat order	1 "	500,000
MOUTIER, SWITZERLAND	2 "	300,000

		Cubic ft. per 24 hrs.
FLEETWOOD	1 Set	300,000
PRESTONPANS	1 "	100,000
PRESTONPANS	1 "	100,000
CORK	1 "	300,000
SELKIRK	1 "	150,000
MORLEY	1 "	200,000
SHEFFIELD	1 "	500,000
SHEFFIELD	1 "	500,000
BATHGATE	1 "	150,000
LITTLEBOROUGH	1 "	200,000
NEWPORT, ISLE OF WIGHT	1 "	150,000
SCUNTHORPE	1 "	300,000
SCUNTHORPE	1 "	300,000
LANGLEY MILL	1 "	300,000
BOLTON	1 "	500,000
WALTON-ON-THAMES	1 "	150,000
WALTON-ON-THAMES	1 "	150,000
KETTERING	1 "	300,000
BISHOP AUCKLAND	1 "	150,000
BISHOP AUCKLAND	1 "	150,000
DRAYCOTT	1 "	200,000
BEDFORD	1 "	750,000
BEDFORD	1 "	750,000
COLNE	1 "	500,000
MUSSELBURGH	1 "	300,000
AMBLESIDE	1 "	100,000
LEYLAND	1 "	200,000
LEYLAND	1 "	200,000
WISBECH	1 "	150,000
ALTRINCHAM	1 "	200,000
ALTRINCHAM	1 "	200,000
GRANGE-OVER-SANDS — repeat order	1 "	100,000
DERBY	1 "	500,000
GRAVESEND	1 "	300,000
KEITH	1 "	50,000
CARNARVON	1 "	300,000
ELLAND	1 "	300,000
ELLAND	1 "	300,000
HEMSWORTH	1 "	100,000
SOUTH ELMSALL	1 "	100,000
HINDLEY	1 "	300,000
HINDLEY	1 "	300,000
ABERCARN	1 "	150,000
GRANGEMOUTH	1 "	200,000
DUNS	1 "	50,000
CONWAY — repeat order	1 "	200,000
BUNCAY	1 "	50,000
HALIFAX	1 "	500,000
HALIFAX	1 "	500,000
HALIFAX	1 "	500,000
HALIFAX	1 "	500,000
BATHGATE — repeat order	1 "	150,000
ANSTRUTHER	1 "	75,000
INVERURIE	1 "	75,000
MALDON	1 "	100,000
STONEHAVEN	1 "	100,000
MOFFAT	1 "	50,000
CIRENCESTER — repeat order	1 "	100,000
REDCAR	1 "	300,000
REDCAR	1 "	300,000
ECREMONT, CUMBERLAND	1 "	150,000
TRANENT	1 "	75,000
ALDERNEY, C. ISLANDS	1 "	50,000
ALDERNEY, C. ISLANDS	1 "	50,000
WICK & PULTENEYTOWN	1 "	75,000
ST. MARY CHURCH, TORQUAY — repeat order	1 "	200,000
ST. MARY CHURCH, TORQUAY — repeat order	1 "	200,000
ABERCARN — repeat order	1 "	150,000
BANGOR	1 "	200,000
BANGOR	1 "	200,000
WELLINGTON, SALOP — repeat order	1 "	300,000
SLEAFORD	1 "	150,000
CORING-ON-THAMES — repeat order	1 "	150,000
LURGAN	1 "	200,000
LURGAN	1 "	200,000
WHITSTABLE — repeat order	1 "	200,000
HARPENDEN — repeat order	1 "	300,000
HASLINGDEN	1 "	200,000
BISHOP'S CASTLE	1 "	50,000
EYEMOUTH	1 "	50,000
LAURENCEKIRK	1 "	50,000
COLNE — repeat order	1 "	500,000
SUZUKI & CO., JAPAN	1 "	500,000
SUZUKI & CO., JAPAN	1 "	500,000
LOUHANS, FRANCE	1 "	150,000
ST. GERMAIN, FRANCE	1 "	500,000
THIZY, FRANCE		
FUSION DES GAZ	1 "	100,000
LES ACIERIES D'ESTAMPAGE	1 "	100,000
BELLEVILLE, CANADA	1 "	300,000
LILLE (with Waste Heat Boilers)	1 "	500,000
LILLE (" " ")	1 "	500,000
SOUTHBANK — repeat order	1 "	400,000

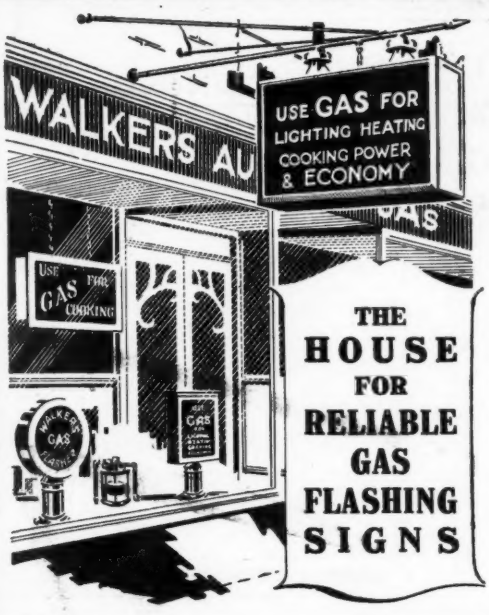
PROMPT DELIVERY CAN BE GIVEN OF PLANTS FROM 50,000 to 1,000,000
Cubic feet per 24 hours.

TULLY GAS PLANTS, LIMITED,

40, Norfolk Street, Strand, London, W.C. 2.

Telegrams: "DAMPER, ESTRAND, LONDON."
Telephone: CITY 4047—8 (2 lines).

Works: MILLGATE, NEWARK.


WALKER'S AU
USE GAS FOR LIGHTING HEATING COOKING POWER & ECONOMY
GAS
USE GAS FOR COOKING
THE HOUSE FOR RELIABLE GAS FLASHING SIGNS

WALKER AUTOMATIC GAS FLASHING SIGNS

ABSOLUTELY reliable and economical—costing far less to run than Electric Signs. They have no bearings to wear or get out of order, and will last a lifetime.

Write for particulars and catalogues to

WALKER AUTOMATIC GAS SIGNS
22, Charterhouse Square, London, E.C. 1

AGENTS:
TILLEY BROS., 55, Kingsland Road, London, E. 2.
BLAND LIGHT SYNDICATE, LTD., 29, Little Trinity Lane, London, E.C. 4.
PEEBLES & CO., LTD., Tay Works, Bonnington, Edinburgh.

ESTIMATES FREE.

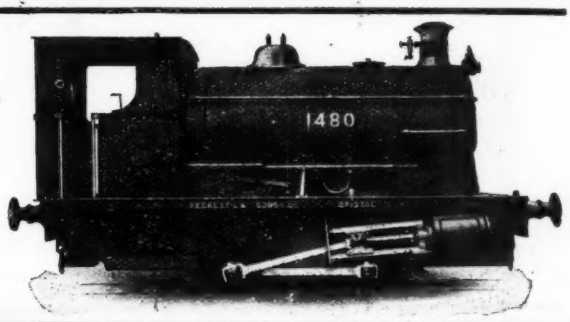
LOCOMOTIVES

LOCOMOTIVES of all Sizes and Gauges specially constructed for Main and Branch Lines, Contractors, Docks, Gas-Works, Collieries, Iron-Works, Brick and Cement Works, &c. Locomotives of various Sizes always in progress for early delivery.

Photographs, Specifications, and Prices on Application.

PECKETT & SONS, LTD., Atlas Locomotive Works, BRISTOL.

Telegraphic Address: "PECKETT BRISTOL."



SPECIAL OFFER OF METERS.

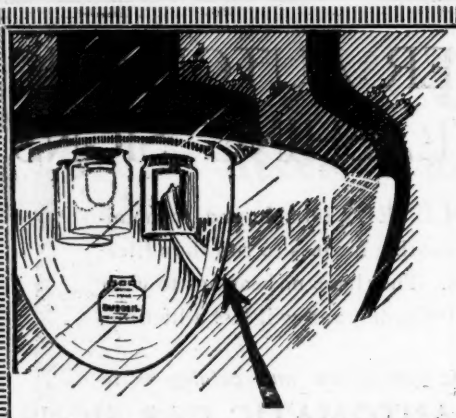
VICKERS LIMITED have pleasure in announcing that they have a strictly limited stock of their well known Accounts Type Patented Meters to clear at the special price of

£2 - 1 - 0 EACH NETT.
DELIVERED FREE. MINIMUM ORDER—SIX METERS.

Each of these meters is covered by the usual five years' guarantee, and is perfect in every way. They are rated at 60 ft. and tested to withstand temporary overloads up to 90 ft., 0·166 cubic ft. per revolution. All parts are standardized, and we hold stocks of all spare parts.

ORDER EARLY TO SECURE THIS OPPORTUNITY.

VICKERS LIMITED, ERITH, KENT.
***Head Office:* Vickers House, Broadway, London, S.W.1.**



THE ALL WEATHER LIGHTING GLASS

QUITE SAFE

DUROSIL

The New Glass

of high thermal endurance, DUROSIL meets all demands. High resistance under all conditions; the broken mantle danger obviated; chemically resistant; cleaning is easier; clear; transparent; does not absorb light nor darken when exposed; brilliant in appearance.

Equally satisfactory for cooking purposes.

We manufacture all kinds of Gas Analysis Apparatus.

DUROGLASS, LTD.
BLACKHORSE LANE, WALTHAMSTOW, E. 17
TELEPHONE : WALTHAMSTOW 934

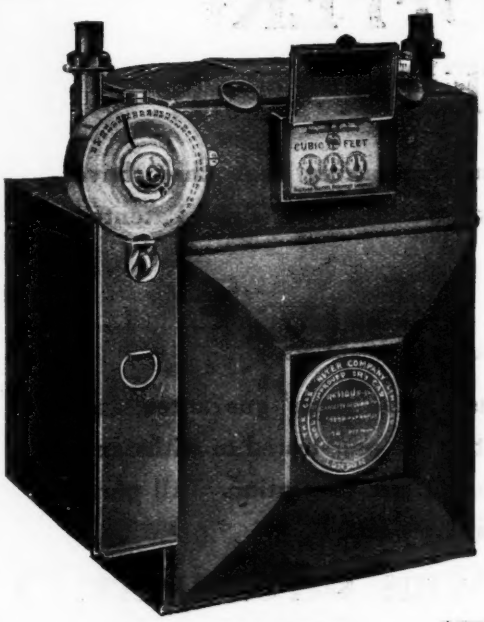
L A

THE GAS METER COMPANY, LTD.,

'Phone : DALSTON 142

238, KINGSLAND RD., LONDON, E.2.

Telegrams : METERPHONE LONDON.



THE "I.C.P." METER.

OUR

IMPROVED "C" PATTERN FRONT ACTION PREPAYMENT METER

COMBINES IMPROVEMENTS, SUGGESTED BY MANY YEARS' EXPERIENCE WITH

PRE-WAR QUALITY MATERIALS AND WORKMANSHIP

STRONG and SIMPLE

MADE TO TAKE ANY COIN

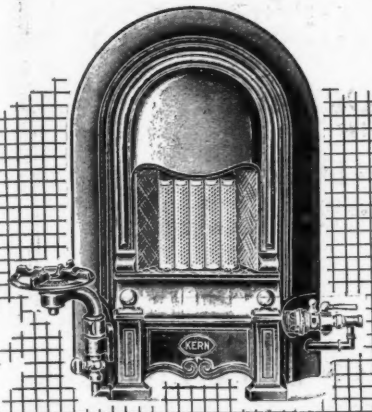
Prices sent on receipt of particulars

OLDHAM UNION STREET.

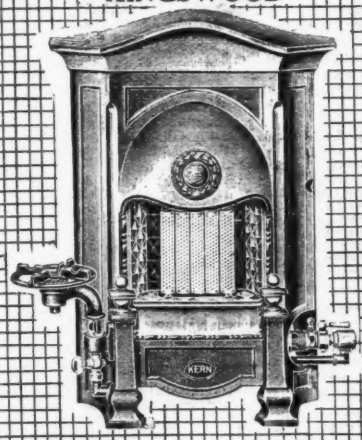
MANCHESTER 18, ATKINSON STREET.

DUBLIN HANOVER STREET.

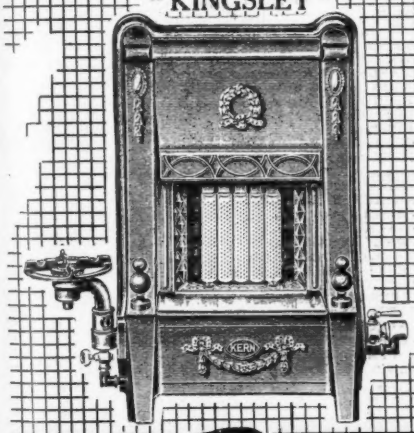
"KELSO"



"KINGSWOOD"



"KINGSLEY"



WELSBACH-KERNS were the first gas fires to be constructed on the Pillar Fuel principle, and the first to be fitted with Gas Regulators and Adjustable Nipples. They are constructed in two sizes, to burn respectively about 10 or 20 cubic feet per hour. Compared with other forms of gas heating, WELSBACH-KERN Radiators are remarkably economical, and, moreover, are extremely simple in working and act efficiently at practically any pressure.

The "KELSO"

With Flue Outlet and Boiling Ring.

NEW DESIGN.

Height	20 ins.
Width	14½ ins.
Weight	29 lbs. 8 ozs.
Connection	¼ in. Iron Barrel.
Consumption	10 c.ft. per hour.

The "KINGSWOOD"

With Flue Outlet and Boiling Ring.

NEW DESIGN.

Height	21 ins.
Width	15 ins.
Weight	29½ lbs.
Connection	¼ in. Iron Barrel.
Consumption	10 c.ft. per hour.

The "KINGSLEY"

With Flue Outlet and Boiling Ring.

NEW DESIGN.

Height	19½ ins.
Width	14½ ins.
Weight	25 lbs.
Connection	¼ in. Iron Barrel.
Consumption	10 c.ft. per hour.

All the above Radiators can be supplied without Boiling Ring if required.

For full particulars of WELSBACH-KERN Gas Radiators, write for our handsomely illustrated Booklet 1923-24, No. 421, to:—

The WELSBACH LIGHT Co., Ltd.,

Welsbach House, King's Cross, W.C. 1.

No. 289

WELSBACH-KERN

BRITISH MADE

GAS RADIATORS

W-D

WOODALL-DUCKHAM VERTICAL RETORTS

FIRST IN 1903 — FOREMOST IN 1923

THE WOODALL-DUCKHAM VERTICAL RETORT & OVEN CONSTRUCTION CO(1920)LTD.

PLANTS ERECTED AND IN COURSE OF ERECTION.

	Capacity in tons per day.
BOURNEMOUTH, England—	
1st installation (BOURNE VALLEY)	40
2nd ,, (POOLE)	3
3rd ,, (POOLE)	120
4th ,, (POOLE)	240
5th ,, (POOLE)	168
LONDON, England—	
Gas Light & Coke Co.,	
1st installation (NINE ELMS)	10
2nd ,, (KENSAL GREEN)	100
3rd ,, (KENSAL GREEN)	120
4th ,, (KENSAL GREEN)	200
BURNLEY, England	90
LAUSANNE, Switzerland	120
LUTON, England (1st installation)	40
,, ,, (2nd installation)	40
,, ,, (3rd installation)	56
LA GRANGE, Illinois, U.S.A.	10
DRESDEN, Germany (1st installation)	20
,, ,, (2nd installation)	140
,, ,, (3rd installation)	180
IPSWICH, Queensland	20
SMETHWICK, England	
(1st installation)	120
,, ,, (2nd installation)	144
HULL England (1st installation)	160
,, ,, (2nd installation)	240
DERBY, Connecticut, U.S.A.	
(1st installation)	40
,, ,, (2nd installation)	40
TOTTENHAM, England	
(1st installation)	80
,, ,, (2nd installation	364
BUDAPEST, Hungary	40
YOKOHAMA, Japan.	120
BIRMINGHAM, England—	
1st installation (WINDSOR ST.)	440
2nd ,, (NECHELLS)	20
3rd ,, (SWAN VILLAGE)	168
4th ,, (WINDSOR ST.)	224
5th ,, (WINDSOR ST.)	660
6th ,, (NECHELLS)	20
7th ,, (NECHELLS)	840
SPALDING, England	20
STRANDVEJ, Denmark	
(1st installation)	60
,, ,, (2nd installation)	40
,, ,, (3rd installation)	60
HOLYOKE, Mass., U.S.A.	60
BIRKENHEAD, England	200
BRISTOL, England	288
CLECKHEATON, England	
(1st installation)	60
,, ,, (extension)	20
KINLOCHLEVEN, Scotland	20
TOULOUSE, France	20
WEST BROMWICH, England	100
MARGATE, England	95
HYDE, England (1st installation)	80
HYDE, England (2nd installation)	40
IPSWICH, England	144
BOLTON, England (1st installation)	180
,, ,, (2nd installation)	168
ABERDEEN, Scotland	100
,, (2nd installation)	192
NICE, France	200
WANGANUI, N.Z. (1st installation)	20
,, ,, (2nd installation)	40
SCHENECTADY, N.Y., U.S.A.	100
BROCKTON, Mass., U.S.A.	80
NEW HAVEN, Connecticut, U.S.A.	160
GREENOCK, Scotland	180
AYR, Scotland	40
MARSEILLES, France	216
MONTBELIARD, France	36
DUNDEE, Scotland (1st installation)	220
,, ,, (2nd installation)	110
ST. ETIENNE, France	270
SOUTH SHIELDS, England	
(1st installation)	108
,, (extension)	18
WALLASEY, England	
(1st installation)	120
,, ,, (2nd installation)	120
KENDAL, England	40
IRVINE, Scotland	23
ROWLEY REGIS, England	20
HAMILTON, Scotland	132
HARROGATE, England	80
TUNIS, N. Africa	35
BRENTFORD (Southall Wks.) England	80
CANNOCK, England	40
PRESCOT, England	20
GLOSSOP, England	40
WORKINGTON, England	
(1st installation)	69
,, ,, (extension)	23
NORMANTON, England	20
MASSENA SPRINGS, N.Y., U.S.A.	
(1st installation)	72
,, ,, (2nd installation)	20
,, ,, (3rd installation)	40
BRADFORD, England	420
MELBOURNE, Aus. (1st installation)	160
,, ,, (2nd installation)	160
,, ,, (3rd installation)	160
BERGEN, Norway (1st installation)	57
,, ,, (2nd installation)	57
TRONDHJEM, Norway	
(1st installation)	76
,, ,, (2nd installation)	38
ELLESMERE PORT, England	
(1st installation)	120
,, ,, (extension)	20
PORTSEA ISLAND, England	
(1st installation)	190
,, ,, (2nd installation)	140
NEWTON-ON-AYR, Scotland	60
FORFAR, Scotland	40
NOTTINGHAM, England	336
CUPAR, Scotland	22
NEWTON-IN-MAKERFIELD, England	
(1st installation)	42
,, ,, (extension)	21
BERLIN, Germany (1st installation)	100
,, ,, (2nd installation)	60
ODENSE, Denmark (1st installation)	80
,, (2nd installation)	40
MERIDEN, U.S.A.	60
BADIN, U.S.A.	60
NIAGARA FALLS, N.Y., U.S.A.	60
MARYVILLE, Tennessee, U.S.A.	80
BRECHIN, Scotland	21
DUNFERMLINE, Scotland	110
LOCHGELLY, Scotland	21
RIPON, England	40
WALSALL, England	100
KILSYTH, Scotland	24
INVERNESS, Scotland	40
STOCKPORT, England	168
GLASGOW, Scotland	1,356
ADELAIDE, Australia	
(1st installation)	80
,, (2nd installation)	100
CARNOUSTIE, Scotland	21
WEXFORD, Ireland	18
NEATH, Wales	60
STOURBRIDGE, England	80
WOLVERHAMPTON, England	
(1st installation)	80
,, (2nd installation)	112
TROON, Scotland	28
WARRINGTON, England	112
MANCHESTER, England	336
KIRKCALDY, Scotland	88
BRIGHTON, Australia	60
FREMANTLE, Australia	20
PERTH, Australia	60
CHRISTCHURCH, New Zealand	40
LANARK, Scotland	21
GOUROCK, Scotland	28
SHEFFIELD, England	336
DAIREN, S. Manchuria	100
PAISLEY, Scotland	140
HINCKLEY, England	60
CHELTENHAM, England	120
MARKET HARBOROUGH England	26
LEATHERHEAD, England	40
THE HAGUE, Holland	168
LIVERPOOL, England	100
PARIS, France	420
GEELONG, Australia	60
INNERLEITHEN, Scotland	7
BUFFALO (N.Y.) U.S.A.	280
RENFREW, Scotland	44

TOTAL CAPACITY—17,880 TONS PER DAY.

For all particulars apply to

The WOODALL-DUCKHAM CO.

HEAD OFFICE: 52 GROSVENOR GARDENS, S.W. 1.

Telephone: 9272 VICTORIA. *Telegrams:* RETORTICAL : : SOWEST.

MANCHESTER DISTRICT OFFICE: LLOYDS BANK BUILDINGS, KING STREET, MANCHESTER

= The =

Directors and Staff

OF

The Horstmann Gear Co., Ltd.

JOIN IN WISHING ALL
THEIR FRIENDS IN
THE GAS INDUSTRY

A Happy Xmas

AND

A Prosperous New Year.

Newbridge Works, Bath.

1838-1923

Eighty-five years' experience
in the Design, Manufacture and Erection of

Condensing, Cooling, Distilling, Drying, Evaporating, Heating, Purifying and Scrubbing Plant

is at your disposal.

BLAIR, CAMPBELL & McLEAN LTD

Engineers
Coppersmiths & Founders

GOVAN, GLASGOW.

London Office
Sardinia House Kingsway W.C.2.

HUMPHREYS & GLASGOW, LTD.

WATER GAS

	Cu. Ft. Daily
Aarhus	800,000
Abertillery	400,000
Abertillery (2) ...	100,000
Admiralty:	
British	800,000
British (2) ...	800,000
British (3) ...	800,000
British (4) ...	800,000
British (5) ...	800,000
French	600,000
French (2) ...	600,000
Agram	200,000
Airdrie	430,000
Aldershot	1,400,000
Aldershot (2) ...	1,000,000
Alkmaar	400,000
Allenstein	200,000
Alost	700,000
Amersfoort	300,000
Amsterdam	1,000,000
Amsterdam (2) ...	1,000,000
Amsterdam (3) ...	2,700,000
Antwerp	1,500,000
Antwerp (2)	1,000,000
Antwerp (3)	1,500,000
Ashford	250,000
Asnieres	650,000
Augsburg	425,000
Aylesbury	150,000
Banbury	200,000
Banff	125 000
Barmen	500,000
Barrow	300,000
Barrow (2)	500,000
Barry	500,000
Bath	1,000,000
Bath (2)	1,000,000
Bath (3)	1,300,000
Belfast	1,700,000
Belfast (2)	4,500,000
Belfast (3)	1,250,000
Belfast (4)	1,250,000
Benrath	125,000
Berlin:	
Charlottenburg ...	2,500,000
Danziger Strasse	1,600,000
Neukoelin	650,000
Neukoelin (2) ...	700,000
Schmargendorf ...	700,000
Tegel	3,500,000
Tegel (2)	5,350,000
Tegel (3)	245,000
Bilston	375,000
Bilston (2)	125,000
Birmingham:	
Adderley Street...	675,000
Nechells	3,000,000
Nechells (2) ...	3,000,000
Nechells (3) ...	3,000,000
Swan Village ...	1,500,000
Windsor Street ...	3,000,000
Windsor Street (2)	3,000,000
Bishop's Stortford..	200,000
Bishop's Stortf'd (2)	300,000
Blois	125,000
Blois (2)	125,000
Bochum	530,000
Bognor	100,000
Bo'ness	125,000
Bordentown, N.J. ...	125,000
Boulogne	340,000
Bournemouth ...	1,000,000
Bournemouth (2) ...	500,000
Bournemouth (3) ...	1,500,000
Bournemouth (4) ...	1,000,000
Bournemouth (5) ...	500,000
Bournemouth (6) ...	1,530,000
Bremen	550,000
Bremen (2)	950,000
Bremen (3)	850,000
Brentford	1,200,000
Brentford (2) ...	850,000
Brentford (3) ...	350,000
Brentford (4) ...	750,000
Brentwood	250,000
Brest	550,000
Bridgwater	200,000
Bridlington ...	150,000
Bridlington (2) ...	200,000
Brieg	100,000
Brierley Hill ...	250,000
Brighton	1,750,000
Brighton (2) ...	1,850,000
Brighton (3) ...	750,000
Brighton (4) ...	2,750,000
Bristol	2,000,000
Bristol (2)	2,500,000
Bromley	1,500,000
Bruges	200,000
Bruges (2)	600,000
Brussels:	
Anderlecht ...	350,000
Anderlecht (2) ...	350,000
Forest	1,000,000
Forest (2)	1,000,000
Forest (3)	1,000,000
Forest (4)	1,500,000
Koekelberg ...	1,000,000
St. Gilles	1,000,000
St. Josse	1,000,000
St. Josse (2) ...	600,000
St. Josse (3) ...	775,000
Ville	750,000
Ville (2)	750,000
Ville (3)	1,500,000
Ville (4)	350,000
Bucarest	1,100,000
Budapest	50,000
Budapest (2) ...	1,750,000
Budapest (3) ...	200,000
Budapest (4) ...	250,000
Caen	250,000
Cambridge	500,000
Cambridge (2) ...	1,000,000
Cardiff	2,000,000
Cardiff (2)	3,000,000
Cardiff (3)	1,950,000
Cardiff (4)	600,000
Carlisle	600,000
Carlsruhe	500,000
Chateauroux ...	125,000
Chateauroux (2) ...	125,000
Châtelet	500,000
Chesterfield ...	430,000
Chesterfield (2) ...	90,000
Chichester	250,000
Chorley	300,000
Cie. des Compteurs—	
Montrouge	1,150,000
Coatbridge	400,000
Commercial, London	850,000
Commercial (2) ...	850,000
Commercial (3) ...	1,250,000
Commercial (4) ...	2,000,000
Commercial (5) ...	800,000
Copenhagen ...	700,000
Copenhagen (2) ...	2,500,000
Copenhagen (3) ...	1,750,000
Courtrai	250,000
Coventry	600,000
Coventry (2) ...	600,000
Coventry (3) ...	800,000
Coventry (4) ...	1,250,000
Cowdenbeath ...	420,000
Cracow	200,000
Cracow (2) ...	200,000
Crefeld	500,000
Crewe	700,000
Crosfield and Sons	1,500,000
" " (2)	1,500,000
Crowborough ...	150,000
Croydon	1,250,000
Croydon (2) ...	625,000
Croydon (3) ...	625,000
Croydon (4) ...	650,000
Croydon (5) ...	650,000
Croydon (6) ...	1,125,000
Deal	250,000
Debreczin ...	100,000
Derby	1,500,000
Derby (2) ...	2,000,000
Deventer	150,000
Deventer (2) ...	200,000
Devonport	1,600,000
Doncaster	1,350,000
Dorking	150,000
Dover	500,000
Dublin	2,000,000
Dublin (2) ...	2,000,000
Dublin (3) ...	650,000
Dudley	600,000
Dundee	1,500,000
Dunedin, N.Z. ...	150,000
Dunedin (2) ...	275,000
Durham	200,000
Dusseldorf	1,000,000
Eastbourne	1,250,000
Edinburgh	2,000,000
Epsom	225,000
Epsom (2)	300,000
Essen	1,400,000
Essen-Borbeck ...	1,400,000
Falmouth	150,000
Faversham	200,000
Flensburg	300,000
Flensburg (2) ...	125,000
Forst	300,000
Frankenthal ...	175,000
Fuel Research Wks.	500,000
Furnes	500,000
Gablonz	140,000
Gas L. & Coke Co.:	
Beckton ...	10,000,000
Beckton (1910) ...	7,000,000
Beckton (1911) ...	3,500,000
Beckton (1912) ...	7,000,000
Beckton (1919) ...	7,000,000
Beckton (1920) ...	5,250,000
Bow Common ...	1,000,000
Bow Common (2)	1,150,000
Bromley	3,750,000
Bromley (2) ...	2,625,000
Fulham	2,500,000
Fulham (2) ...	1,700,000
Kensal Green ...	2,250,000
Kensal Green (2)	2,250,000
Kensal Green (3)	2,250,000
Nine Elms... ...	2,750,000
Shoreditch ...	900,000
Shoreditch (2) ...	2,700,000
Stratford	1,700,000
Stratford (2) ...	850,000
Gelsenkirchen ...	175,000
Gelsenkirchen (2)...	350,000
Geneva	500,000
Geneva (2)	700,000
Glasgow	3,000,000
Glasgow (2) ...	2,500,000
Glasgow (3) ...	2,250,000
Gloucester	800,000
Gosport	200,000
Goteborg	300,000
Goteborg (2) ...	600,000
Graudenz	200,000
Grays	250,000
Grays (2)	400,000
Guildford	350,000
Guildford (2) ...	200,000
Guildford (3) ...	350,000
Haarlem	850,000
Hamburg	1,750,000
Hampton Court ...	500,000
Hampton Court (2)	600,000
Hanley	800,000
Hartlepool	750,000
Hartlepool (2) ...	765,000
Hebden Bridge ...	200,000
Heidelberg	200,000
Hereford	525,000
Hilversum	850,000
Hinckley	250,000
Holyoke, Mass. ...	600,000
Hong Kong	450,000
Hornsey	2,750,000
Hull	1,500,000
Hull (2)	1,000,000
Ilford	650,000
Ilford (2)	750,000
Innsbruck	200,000
Ipswich	750,000
Ipswich (2)	1,250,000
Kampen	350,000
Karlsbad	350,000
Kiel	1,000,000
Kiel (2)	880,000
Kilmarnock ...	600,000
Kirkintilloch ...	360,000
Kolozvar	100,000
Lancaster	500,000
Lausanne	250,000
Lausanne (2) ...	385,000
Lawrence, Mass. ...	400,000
Le Mans	420,000
Lea Bridge	350,000
Lea Bridge (2) ...	350,000
Lea Bridge (3) ...	400,000
Lea Bridge (4) ...	1,000,000
Lea Bridge (5) ...	1,500,000
Lea Bridge (6) ...	1,530,000
Leamington	600,000
Leamington (2) ...	525,000
Leeds	1,500,000
Leeuwarden	400,000
Leiden	500,000
Leiden (2)	575,000
Leigh	350,000
Lemberg	260,000
Lemberg (2)	500,000
Liége	1,000,000
Liége (2)	750,000
Lille	880,000
Lincoln	500,000
Liverpool	3,500,000
Liverpool (2) ...	4,500,000
Liverpool (3) ...	750,000
Liverpool (4) ...	1,250,000
Liverpool (5) ...	1,250,000
Liverpool (6) ...	3,000,000
Liverpool (7) ...	1,500,000
Liverpool (8) ...	1,250,000
Long Eaton ...	430,000
Longton	600,000
Louvain	800,000
Lubeck	400,000
Luton	400,000
Maastricht	200,000
Macclesfield	800,000
Magdeburg	1,400,000
Maidenhead ...	225,000
Maidenhead (2) ...	225,000
Maidenhead (3) ...	175,000
Maidenhead (4) ...	175,000
Maidstone	500,000
Maidstone (2) ...	500,000
Malines	500,000
Malines (2)	575,000
Malmö	350,000
Malta	400,000
Manchester	3,500,000
Manchester (2) ...	3,500,000
Manchester (3) ...	1,500,000
Mansfield	330,000
Marlborough ...	100,000
Mayence	700,000
McKeesport, Pa. ...	500,000
Merthyr Tydfil ...	300,000
Merthyr Tydfil (2)	200,000
Middlesbrough ...	1,250,000
Middlesbrough (2)..	750,000
M/M. Woolston ...	9,000,000
Menaco	275,000
Mons	500,000
Moscow	1,000,000
Munich	1,400,000
Namur	175,000
Narbonne	350,000
Nelson	400,000
Neuss	140,000
Newburgh, N.Y. ...	600,000
Newbury	250,000
Newcastle, N.S.W....	500,000
New York	5,200,000
Nictheroy	250,000
N. Middlesex ...	150,000
N. Middlesex (2) ...	200,000
N. Middlesex (3) ...	75,000
N. Middlesex (4) ...	650,000
N. Middlesex (5) ...	650,000
N. Middlesex (6) ...	1,000,000
North Sydney ...	500,000
North Sydney (2) ...	500,000
Norwich	1,000,000
Norwich (2) ...	300,000
Norwich (3) ...	500,000
Norwich (4) ...	1,500,000
Nottingham ...	1,000,000
Nottingham (2) ...	1,000,000
Nuneaton	125,000
Oberhausen ...	175,000
Oldbury	500,000
Oldenburg	200,000
Ormskirk	170,000
Ostend	100,000
Ostend (2)	200,000
" Zandvoorde	700,000
Paris:	
Landy	5,400,000
Villette	3,600,000
Clichy	3,600,000
Pau	550,000
Pembroke	240,000
Perigueux	350,000
Perth, W.A.	125,000
Piggott and Co. ...	1,500,000
Poitiers	350,000
Pontypool	1,000,000
Port Elizabeth ...	400,000
Portsmouth	1,000,000
Portsmouth (2) ...	2,000,000
Portsmouth (3) ...	800,000
Posen	450,000
Posen (2)	700,000
Prague	140,000
Preston	1,400,000
Ramsgate	430,000
Reading	1,000,000
Reading (2)	1,000,000
Redditch	500,000
Redhill	275,000
Redhill (2)	300,000
Reichenberg ...	200,000
Reichenberg (2) ...	200,000
Reval	350,000
Rhymney	175,000
Rhymney (2) ...	250,000
Ripley	120,000
Rochester	2,200,000
Romford	300,000
Romford (2)	350,000
Rotterdam	850,000
Rotterdam (2) ...	1,500,000
Rotterdam (3) ...	750,000
Rotterdam (4) ...	750,000
Rotterdam (5) ...	600,000
Rotterdam (6) ...	2,000,000
Royston (Yorks.) ...	250,000
Rugby	1,000,000
Rushden	425,000
St. Albans	700,000
St. Andrews ...	210,000
St. Gallen	225,000
St. Gallen (2) ...	225,000
St. Joseph	750,000
Sté. Chim. de la Cr. Parolsse ...	1,320,000
San Paulo	700,000
Santiago, Cuba ...	400,000
Scarborough ...	800,000
Scarborough (2) ...	200,000
Scarborough (3) ...	350,000
Scarborough (4) ...	1,300,000
Seaford	200,000
Shanghai	225,000
Shanghai (2) ...	225,000
Shanghai (3) ...	1,600,000
Sheerness	200,000
Sheerness (2) ...	180,000
Sheffield	1,530,000
" Steel Prods.	5,000,000
Shrewsbury ...	300,000
Southall	2,000,000
Southall (2) ...	2,000,000
Southampton ...	800,000
Southampton (2) ...	500,000
Southampton (3) ...	600,000
Southampton (4) ...	100,000
Southampton (5) ...	1,000,000
Southend	1,250,000
Southend (2) ...	900,000
Southend (3) ...	900,000
Southgate	400,000
Southgate (2) ...	500,000
Southgate (3) ...	800,000
Southport	750,000
Southport (2) ...	900,000
Southport (3) ...	700,000
South Shields ...	650,000
South Shields (2) ...	1,250,000
Stafford	500,000
Staines	600,000
Stettin	850,000
Stirling	400,000
Stockholm	1,500,000
Stockholm (2) ...	1,750,000
Stockport	600,000
Stockport (2) ...	600,000
Stockport (3) ...	400,000
Stockport (4) ...	400,000
Stockton	500,000
Stockton (2) ...	250,000
Stourbridge ...	500,000
Stourbridge (2) ...	500,000
Sunderland ...	2,250,000
Swansea	750,000
Swansea (2) ...	1,000,000
Swansea (3) ...	450,000
Swansea (4) ...	1,250,000
Swindon	300,000
Swindon (2) ...	450,000
Sydney	1,000,000
Sydney (2) ...	1,000,000
Sydney (3) ...	1,000,000
Sydney (4) ...	1,000,000
Syracuse, N.Y. ...	850,000
Taunton	225,000
Taunton (2) ...	350,000
The Hague	1,000,000
The Hague (2) ...	500,000
The Hague (3) ...	1,750,000
Tilburg	400,000
Tirlemont	120,000
Tokyo	2,000,000
Torquay	350,000
Torquay (2)	350,000
Torquay (3)	320,000
Tottenham	750,000
Tottenham (2) ...	750,000
Tottenham (3) ...	350,000
Tottenham (4) ...	1,000,000
Tottenham (5) ...	1,000,000
Tottenham (6) ...	1,250,000
Tottenham (7) ...	2,500,000
Tottenham (8) ...	1,000,000
Tournai	700,000
Tours	550,000
Trowbridge	250,000
Tunbridge Wells ...	1,000,000
" " (2)	1,000,000
Tunis	175,000
Tynemouth	1,100,000
Ulm	400,000
Utrecht	1,000,000
Utrecht (2)	1,000,000
Verviers	1,000,000
Vienna	3,500,000
Vienna (2)	2,500,000
Walsall	750,000
Waltham	400,000
Waltham (2) ...	140,000
Wandsbek	125,000
Wandsworth ...	1,800,000
Warwick	125,000
Wasmuel	500,000
Watford	300,000
Watford (2) ...	350,000
Watford (3) ...	400,000
Wath	430,000
Weimar	100,000
Wellingborough ...	525,000
Wellingborough (2)	525,000
Wellington, N.Z. ...	350,000
West Bromwich ...	550,000
Westgate	250,000
Weston-Mare ...	350,000
Weston-Mare (2) ...	350,000
Weston-Mare (3) ...	150,000
Weston-Mare (4) ...	150,000
Wexford	100,000
Weymouth	400,000
Weymouth (2) ...	100,000
Widnes	500,000
Wiesbaden	850,000
Winchester	225,000
Winchester (2) ...	125,000
Winchester (3) ...	410,000
Woking	400,000
Wolverhampton ...	1,500,000
Wolverhampton (2)	1,000,000
Wolverhampton (3)	250,000
Worthing	525,000
Yarmouth	500,000
Yeovil	340,000
Zwolle	200,000
Zwolle (2)	200,000
Zwolle (3)	700,000

711 *Sets of Humphreys-Glasgow Plant have been (and are being) installed with a capacity of over* **506,000,000** *cubic ft. of Water-Gas per diem. Including the work of their American Colleagues,* **1666** *Sets have been constructed with a total* **DAILY** *capacity of* **1,470,000,000** *cubic feet.*

88, VICTORIA STREET, LONDON, S.W. 1. **Brussels Office: 82, Rue du Trône, Ixelles.**

CONTENTS.

EDITORIAL NOTES.

1923: A Retrospect 823
Lower Prices for Gas Coal Contracts—Increased Price Recommended—The "Home Circle"—Gas Coal Shipments—Gas Coke Exports—Increased Sulphate of Ammonia Exports 831

Personal 832
Obituary 832
Electricity Supply Memoranda 832
Chemical Topics from Current Literature. By H. J. Hailstone 833
A New Automatic Valve for Gas-Meters . . 834
Removing Organic Sulphur from Gas—A Description of Processes. By Dr. A. R. Powell 834
Yorkshire Junior Gas Association—Naphthalene: Its Deposition from Coal Gas. By W. I. Ineson 835
Notes on Modern Carbonization in Continuous Vertical Retorts. By A. Y. Plant 838
Illuminating Engineering Society—Important Suggestions for Adequate Illumination . 840

CORRESPONDENCE.

Tully-Gas Analysis 840
The Macdonald Gas Analysis Apparatus . . 840
Sulzer Dry Coke Cooling Plant 840
Gas Coke Supplies and Use 841

REGISTER OF PATENTS.

Closures for Retorts—Davidson, T. M. . . 841
Prepayment Mechanism—Anderson, J. . . 841
Steam Superheaters—South Metropolitan Gas Company, Chandler, D., and Cooke, J. J. . 842
Radiators—Yeates, H. E. 842
Gas-Fire Burners—Fricker, E. H. 842
Low-Temperature Distillation of Non-Coking Materials—Koppers, H. 842
Side Sheeting of Spiral-Guided Gasholders—Dempster, R. & J., Ltd., and Beard, G. F. H. 842
Dry Gas-Meters—Cooke, A. G., and Phillips, B. C. 842
Applications for Patents 842

LEGAL INTELLIGENCE.

Sequel to a Gas Explosion 843
Re W. G. Field (trading as W. G. Field & Co.) 843

MISCELLANEOUS NEWS.

Gas Regulation Act Applications 843
Bath Electricity Undertaking and the Public Lighting—A Reply to "Journal" Comments 843
The North-East Coast Coal Trade 844
Yorkshire and Lancashire Coal Trade . . 844
Coal Trade in the Midlands 844
Stock Market Report 845
Current Sales of Gas Products 849

PARAGRAPHS.

Resonance Method of Gas Analysis—Another Gas-Works Rating Reduction 831
Low-Temperature Carbonization — London Fogs and the Death Rate 834
Two New Books on Fuel 835
Quality of Stockton Gas 842
"Underground London"—Coal Supplies for Belfast—Yorkshire Gas Coal Contracts . 843
London County Council and Gas Charges . 844
Stream-Line Filter Company, Ltd.—Redcar Gas Undertaking — Bathroom Fatality at Bournemouth 846

"JOURNAL" OFFICE TELEPHONE.
The "Journal" Office Telephone Number is "6857 Holborn."
For List of "JOURNAL" Advertisers, see p. 849.

Kent's Sensitive Type Gas Meter Recorder.

This Recorder works in conjunction with a Venturi Tube or Orifice Fitting, and has been developed for the purpose of measuring the flow of gases which are passed at low static pressures, such as the gas in boiler flues, producer gas from retort houses, etc. It is accurate on flows down to one-eighth of the maximum.

The Recorder can be supplied fitted with Diagram only, or Counter only, or with both forms of registration as shown in illustration.

Full descriptive Catalogues sent on application.

George Kent Ltd
LONDON & LUTON

Sales Office: 199, HIGH HOLBORN, LONDON, W.C.1.

Dry Gas Meters.

LARGE OR SMALL.

ANY SIZE.
ANY QUANTITY.
ACCURATE and DURABLE.

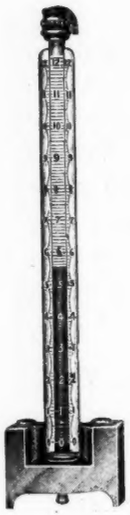
Thomas Glover & Co., Ltd.,

Original Makers — Estab. over Three-Quarters of a Century.

GOTHIC WORKS, ANGEL ROAD, EDMONTON, LONDON, N. 18.

BIRMINGHAM, BRISTOL, BELFAST, EDINBURGH (Gothic Works, Beaverhall Road), FALKIRK, GLASGOW, MANCHESTER, NEWCASTLE (Gothic Works, Dunn Street), MELBOURNE.

PARKINSON'S



SINGLE-TUBE GAUGES

PRESSURE, VACUUM. DIFFERENTIAL.

One pattern, with interchangeable connections.

Sizes: 9" 12" 18" 24" 30" 36".

The scale starts from zero.

For **Water** in inches and millimetres.

For **Mercury** in inches of water, inches of mercury and lbs. per sq. inch.

W. PARKINSON & CO.,

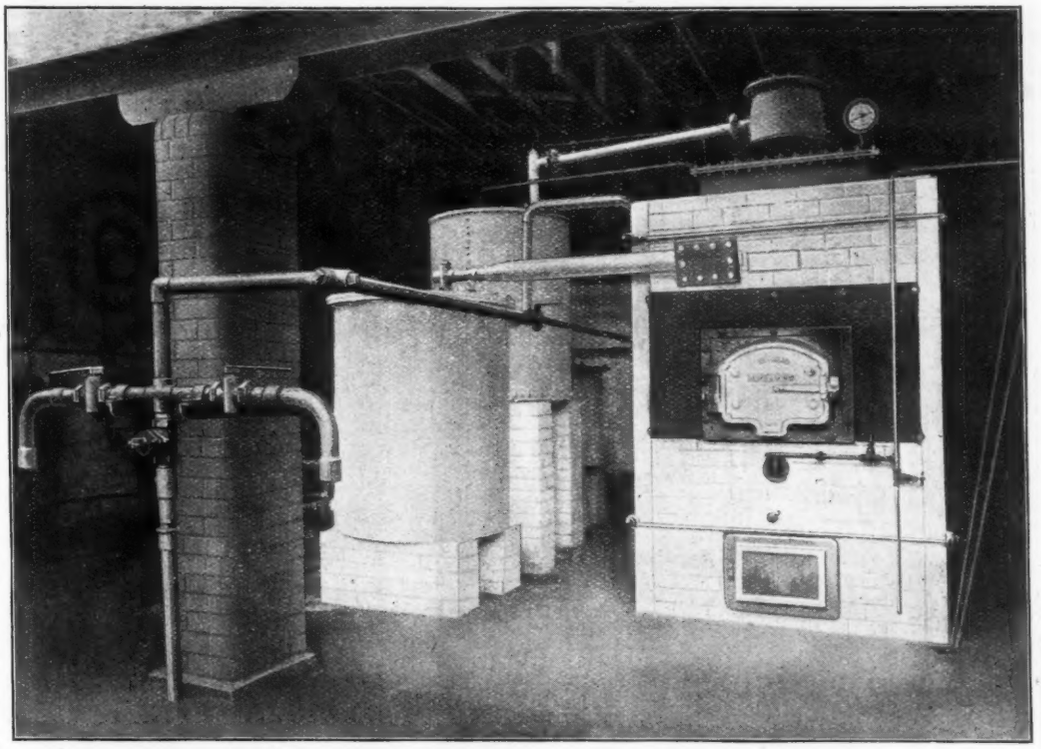
(INCORPORATED IN PARKINSON AND W. & B. COWAN, LTD.)

COTTAGE LANE. CITY ROAD, LONDON.	BELL BARN ROAD, BIRMINGHAM.	MORNINGTON STREET, ORMEAU ROAD, BELFAST.
Telegrams: "INDEX, LONDON."	"GASMETERS, B'HAM."	"PREPAYMENT, BELFAST."
'Phone Nos.: 4270 Clerkenwell	2245 Midland, B'ham.	3374 Belfast.

CONTINUOUS TAR DEHYDRATION

T.I.C

SYSTEM.



TAR DEHYDRATION UNIT—GLASTONBURY CORPORATION.
Capacity—100 gals. per hour.

NO COMPLICATED PARTS.

For all particulars apply to

The WOODALL-DUCKHAM CO.

HEAD OFFICE: 52 GROSVENOR GARDENS, S.W. 1.

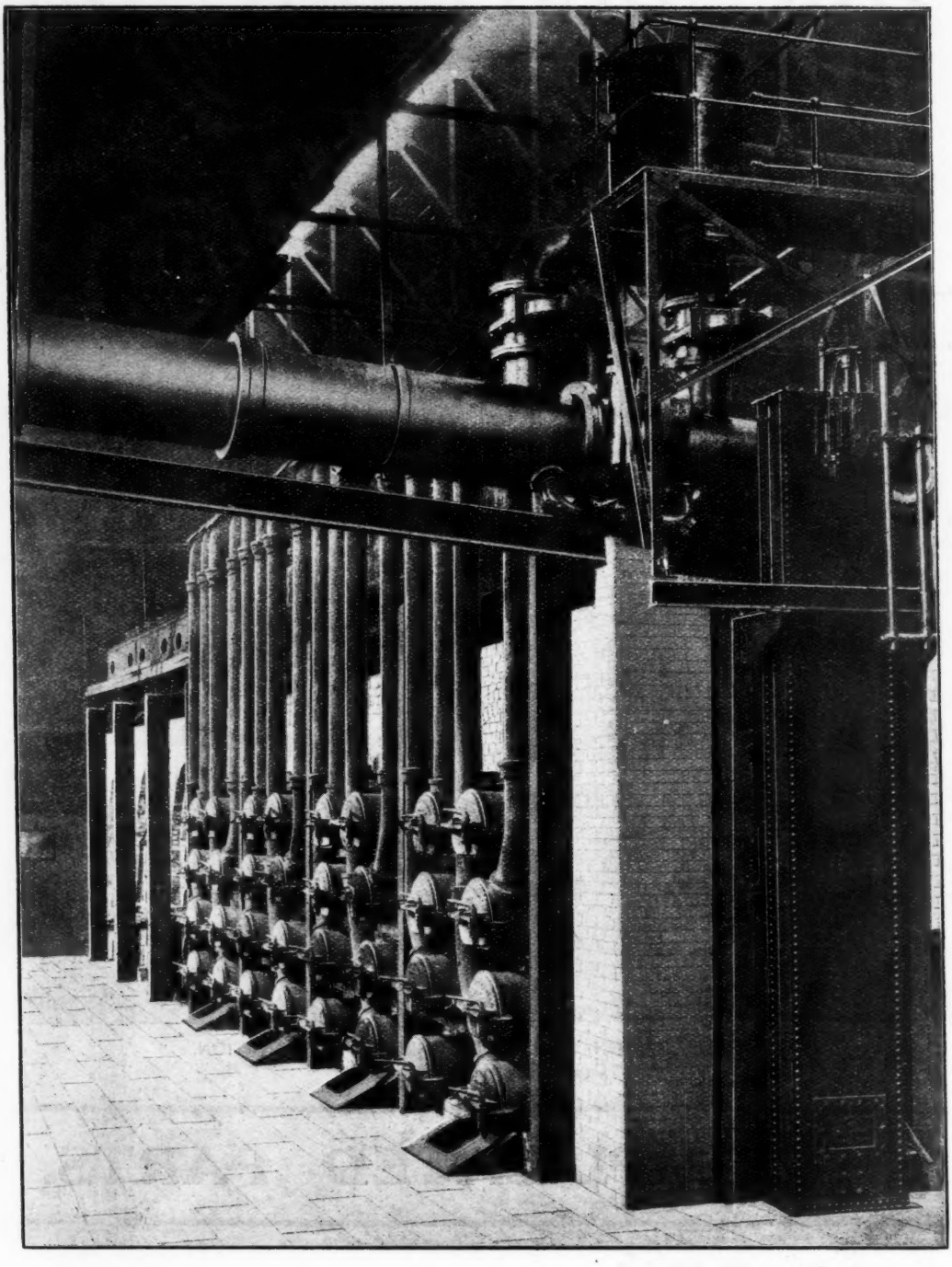
Telephone: 9272 VICTORIA. *Telegrams:* RETORTICAL : : SOWEST.

MANCHESTER DISTRICT OFFICE: LLOYDS BANK BUILDINGS, KING STREET, MANCHESTER.

(*The* WOODALL-DUCKHAM VERTICAL RETORT & OVEN CONSTRUCTION CO.(1920) LTD.

ROBERT DEMPSTER & SONS, LTD.,

ELLAND, YORKS.

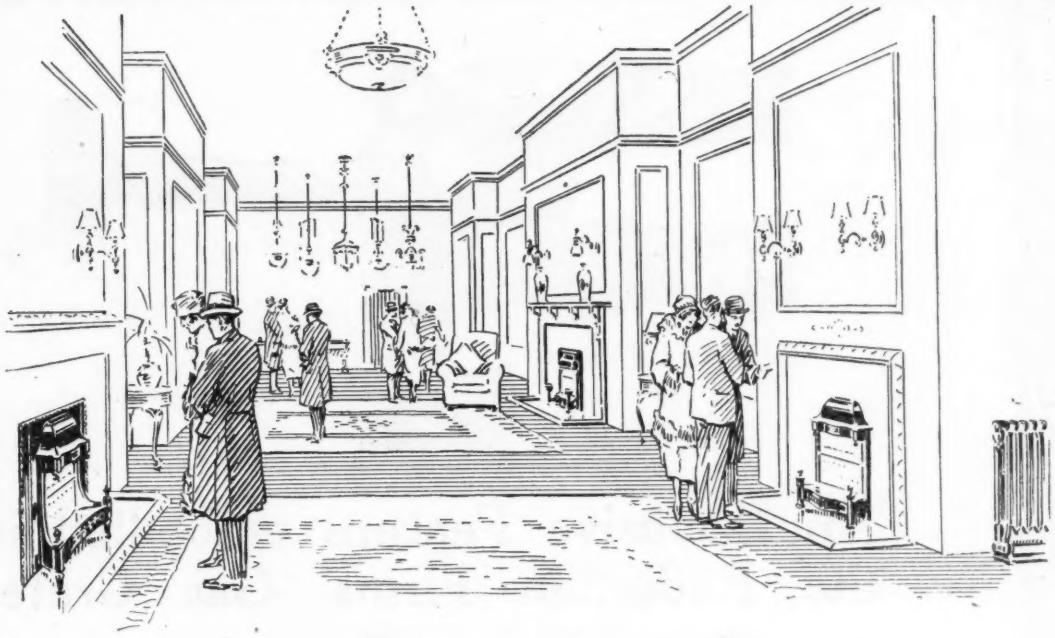


HORIZONTAL RETORT INSTALLATIONS

COMPLETE WITH COAL AND COKE HANDLING PLANT AND STOKING MACHINERY.

TELEGRAMS:
"DEMPSTERS, ELLAND."

TELEPHONE: 261 ELLAND.
PRIVATE BRANCH EXCHANGE.



Service!

IN the Showroom PARKINSON GAS-FIRES display an individuality which claims the customer's attention.

Their refinement of design and high heating and ventilating efficiency is also a claim upon the discriminating Gas Engineer and Manager.

They enable him to give a well organised and appreciative Service to the Consumer, together with an expeditious and economical handling of all maintenance work.

THERE are many models of Parkinson Gas Fires.

There are, however, but one set of standardised parts for each standard size.

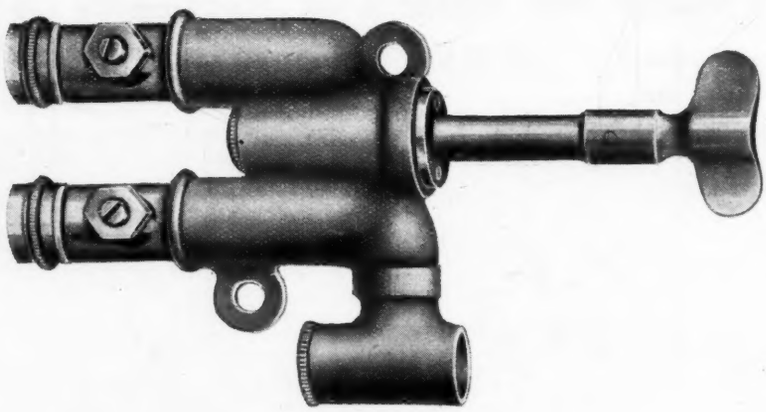
This factor is of immense importance where overhead charges are concerned.

BY FITTING PARKINSON FIRES YOU ARE IMPROVING YOUR ORGANIZATION AND REDUCING YOUR MAINTENANCE COSTS

The "Westminster."

THE PARKINSON STOVE CO., LIMITED.

LONDON:	*BIRMINGHAM:*	*GLASGOW:*
129, High Holborn.	*Stechford.*	*57, John St., Bridgeton.*

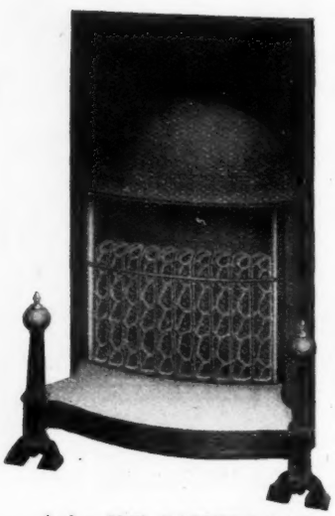


An Exclusive Feature embodied in the Radiation Firms' Gas Grates

The Radiation Patent Gas-injector is manufactured with the utmost precision and ensures a correctly proportioned mixture under widely varying conditions of service. It embodies **separate adjustments** for pressure and calorific value, the ranges being from 15/10ths to 70/10ths, and 350 to 600 B.Th.U. per cubic foot, respectively. These adjustments are very simple and easily accessible.

The highly desirable quality of burning in ABSOLUTE SILENCE, whatever the tap position, is a further striking feature of the Radiation Gas Grates.

Send for Illustrated Lists.



Arden Hill's "SOVEREIGN" Gas Grate,
with Radiation Patent "Thermo XX" firefront and "Injector-Ventilator."

ARDEN HILL & CO., Acme Works, Aston, Birmingham.

THE DAVIS GAS STOVE CO., Ltd., 60, Oxford Street, London, W. 1, and Luton.

FLETCHER, RUSSELL & CO., Ltd., Palatine Works, Warrington, and London.

THE RICHMOND GAS STOVE & METER CO., Ltd., 164-172, Queen Victoria Street, London, E.C. 4, and Warrington.

WILSONS & MATHIESONS, Ltd., Carlton Works, Armley, Leeds, and London.

JOHN WRIGHT & CO., Essex Works, Aston, Birmingham, and London.

RADIATION LTD.
PROPRIETORS.

¶ Untiring efforts to keep Gas well ahead of all competitive fuels have resulted in the production of the "New World" Gas Cooker. With it, a degree of accuracy in cooking is attained that was hitherto considered impossible. Its amazing success with the Public was not unexpected, and is resulting in a new host of converts to Gas Cooking.

Owing to extreme simplicity of design, and reduction of the number of parts, this Cooker is exceptionally light on maintenance charges.

The RADIATION

"NEW WORLD"

Self-Controlled Gas Cooker

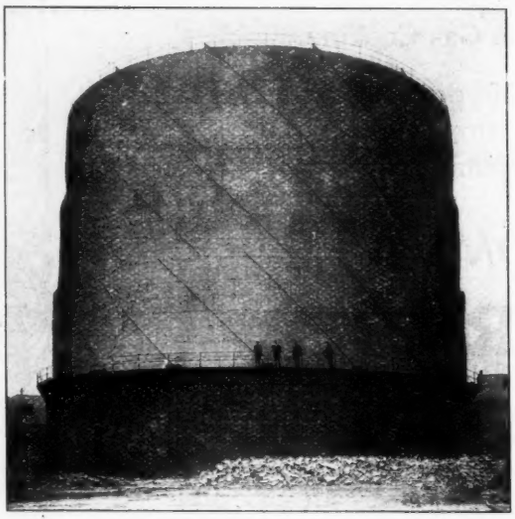
Unprecedentedly high efficiency is an outstanding feature of the "New World" oven. Cooking of all kinds is done with a great saving of gas. The entire space, right from the bottom to the top, is good cooking space. So uniform is the heating that food once placed into position need not be moved until it is completely cooked. There are no loose shelf supports in the oven, all grids, &c., being carried directly on the smooth enamelled sides, which greatly simplifies cleaning. The oven drip-pan rests on guides at the bottom of the oven, thus closing it, and keeping out dust When the "Regulo" Heat Controller is supplied, cooking becomes automatic. A cooking chart is provided for the consumer, giving correct settings for a wide range of foods with times required for cooking. The temperature, when once set, is maintained without variation. The "Regulo" is entirely independent of changes in gas pressure. It is a high-grade, fully tested fitment in every way. The "Accurette" dial tap is standard with the Cooker and is supplied where the "Regulo" is not ordered. The former has an engraved dial, by which the gas supplied to the oven may be set at points found by previous experience to be correct for cooking certain foods. This dial tap enables successes to be repeated, once a note has been made of the "setting" used. A fully illustrated booklet may be obtained on application.

Send for Illustrated Lists.

WATER GAS PLANT.

ECONOMICAL GAS APPARATUS CONSTRUCTION COMPANY, LIMITED.

36, Victoria Street, London, S.W.



700,000 C. FT.—BARRY.

GASHOLDERS

GUIDE-FRAMED SPIRAL-GUIDED STEEL TANKS

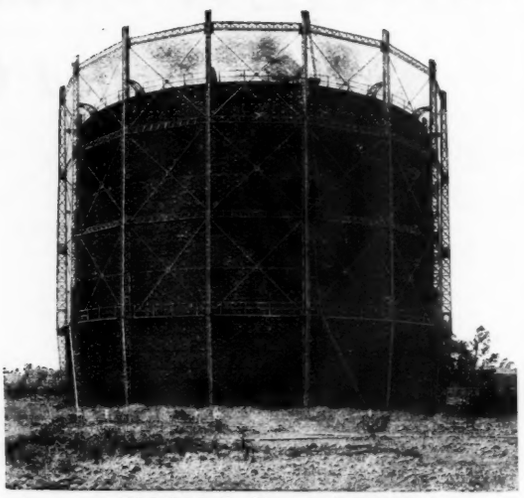
60 YEARS'
UNRIVALLED EXPERIENCE

LONDON OFFICE: 110, CANNON ST., E.C. 4.

C. & W.

WALKER

LIMITED,
DONNINGTON,
NEWPORT — SALOP.



800,000 C. FT.—SANTIAGO.

GOODALL, CLAYTON & Co., Ltd., LEEDS.

INTERMITTENT VERTICAL RETORTS

YIELD HIGHEST RESULTS.

Sole Makers and Erectors of

THE "LEEDS" INTERMITTENT VERTICALS.

CONVEYORS, ELEVATORS, BUNKERS, ROOFS, COAL BREAKERS, HOISTS, &c.

RETORT SETTINGS - PRODUCERS - FURNACES - REPAIRS.

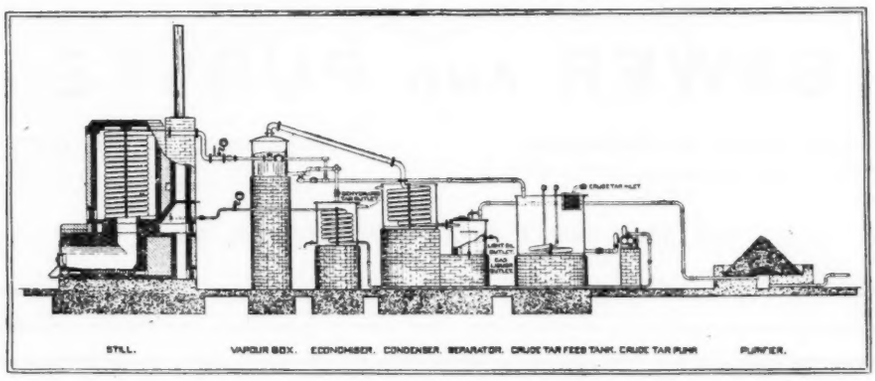
Wilton

Patent

CONTINUOUS TAR DEHYDRATION

AND

DISTILLATION PLANT.



Simple in Construction.
Economical in Working.
Entire absence of Fire Risks.

MADE IN SEVERAL STANDARD SIZES.

The whole plant can be put in operation in about one hour from lighting up and shut down in the day, or can be continuously worked according to the demand for dehydrated tar.

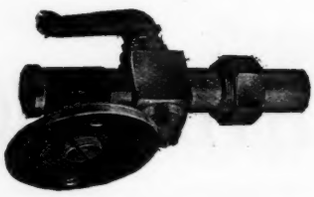
Full particulars on Application to

The Chemical Engineering and Wilton's Patent Furnace Co., Ltd.,

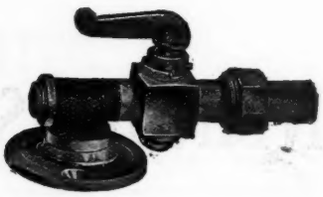
Telephone: *VICTORIA* 2417. **76, Victoria Street, London, S.W.** *Telegrams:* "*Evaporator-Phone-London.*"

FRANCE: SOCIÉTÉ WILTON, 233, BOULEVARD GAUTIER, BORDEAUX.

TWO-WAY GAS FIRE TAP



USED AS STRAIGHT-WAY TAP



USED AS ELBOW TAP

The alteration is made by changing the position of screwed plug.

SAWER AND PURVES

NELSON METER WORKS, **MANCHESTER.**

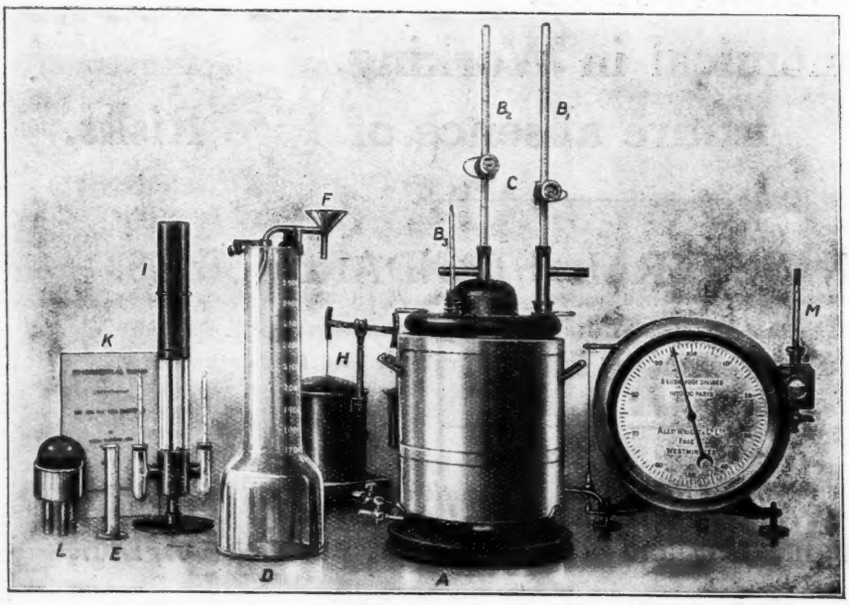
WIRES { "SAWER MANCHESTER." "SAWER NOTTINGHAM."

RADFORD METER WORKS, **NOTTINGHAM.**

TELEPHONE NOS. { 3289 (City) MANCHESTER. 2025 (Central) NOTTINGHAM.

45/47, WESTMINSTER BRIDGE ROAD, **LONDON, S.E. 1.**

BOYS CALORIMETER



GAS REGULATION ACT, 1920.

CALORIMETER

as prescribed

by

GAS REFEREES.

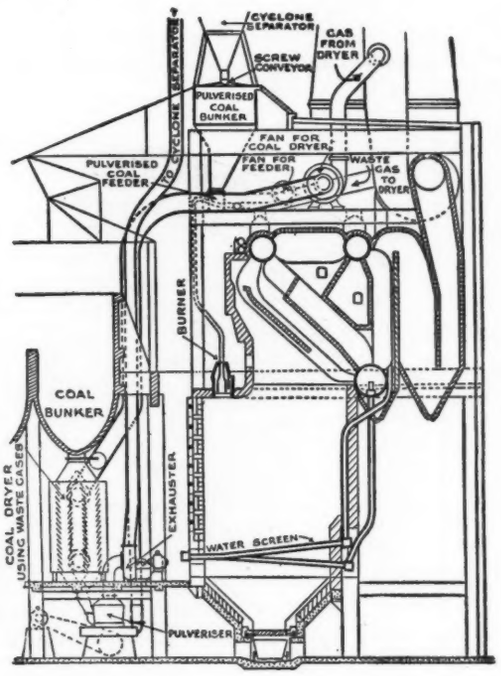
ALEXANDER WRIGHT & Co., Ltd.,

1, WESTMINSTER PALACE GARDENS, WESTMINSTER, S.W. 1.

UNDERFEED STOKER COMPANY, LIMITED,
COMBUSTION ENGINEERS.

"LOPULCO" SYSTEM
OF
PULVERISED FUEL.

Patent Rights held by Underfeed Stoker Co. for various countries.



Cross Section of the Vitry Station of the Scé. Anme. Union d'Electricité, Paris, where the system is being installed. There are four Boilers, each with a heating surface of 16,678 square feet. Normal Evaporation per boiler per hour from and at 212°F., 140,580 lbs. Maximum Evaporation per boiler per hour from and at 212° F., 210,870 lbs.

ALDWYCH HOUSE, ALDWYCH, LONDON, W.C.2.—Works: DERBY.

GASHOLDERS
GUIDE FRAMED — SPIRAL — STEEL TANKS.

PURIFIERS
LUTELESS PURIFIER CONVERSIONS A SPECIALITY.

CONDENSERS
WATER TUBE — VERTICAL OR HORIZONTAL.

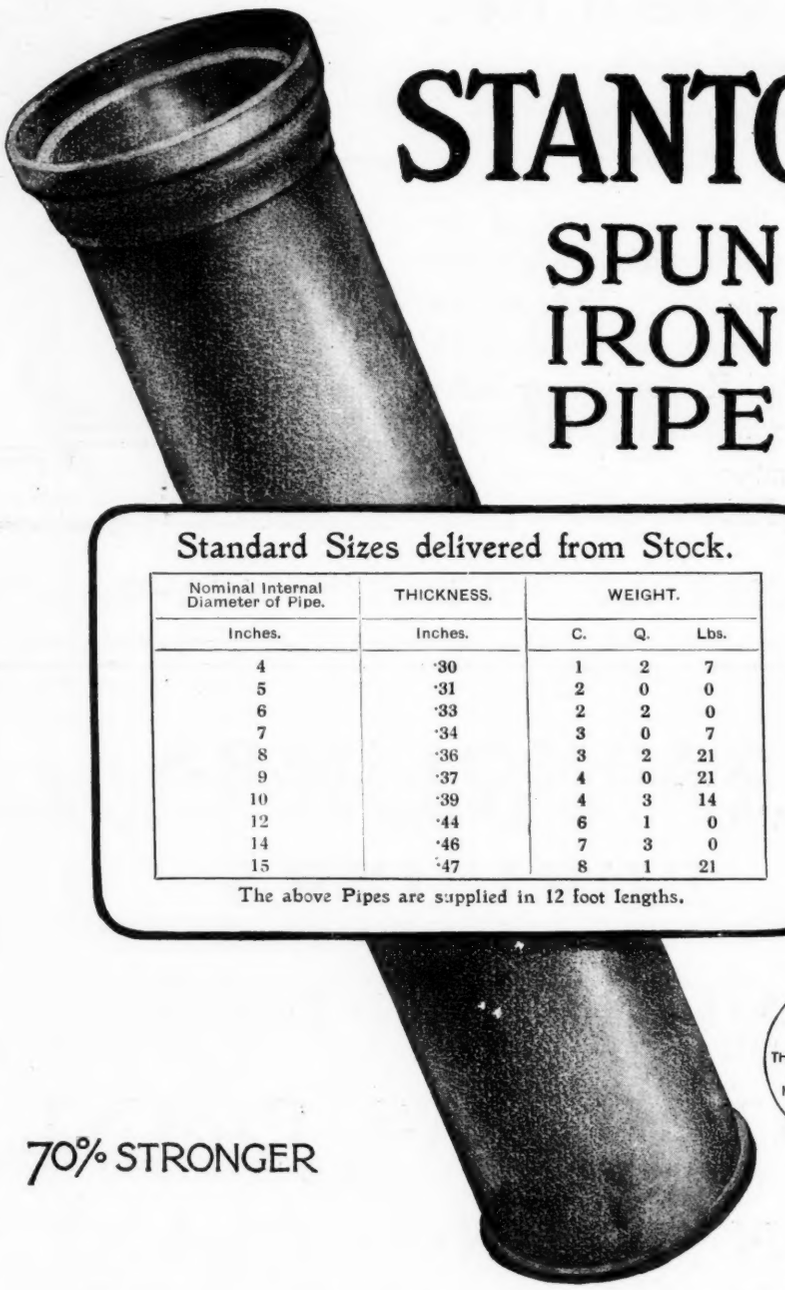
WATER GAS PLANT
BLUE OR CARBURETTED — HIGHEST EFFICIENCY.

CONVEYING PLANT
BAND CONVEYORS — TELPHERS.

ENQUIRIES INVITED FOR ALL GAS APPARATUS.

SAML. CUTLER & SONS, LTD.,
39, VICTORIA STREET, WESTMINSTER, S.W. 1. LONDON. PROVIDENCE IRON WORKS, MILLWALL, E.

350



STANTON
SPUN IRON PIPE

Standard Sizes delivered from Stock.

Nominal Internal Diameter of Pipe.	THICKNESS.	WEIGHT.		
Inches.	Inches.	C.	Q.	Lbs.
4	·30	1	2	7
5	·31	2	0	0
6	·33	2	2	0
7	·34	3	0	7
8	·36	3	2	21
9	·37	4	0	21
10	·39	4	3	14
12	·44	6	1	0
14	·46	7	3	0
15	·47	8	1	21

The above Pipes are supplied in 12 foot lengths.

MANUFACTURED UNDER LICENCE FROM THE INTERNATIONAL DE LAVAUD MANUFACTURING CORPORATION LTD.

70% STRONGER

THE STANTON IRONWORKS COMPANY LIMITED
NEAR NOTTINGHAM.

Telephone: 86 ILKESTON. Telegrams: STANTON, ALFRETON.

SULPHURIC ACID.

SPECIALLY prepared for the manufacture of SULPHATE OF AMMONIA.

SPENCER CHAPMAN & MESSEL, LTD.,
with which is amalgamated WM. PEARCE & SONS, LTD.
96, Mark Lane, LONDON, E.C. Works—SILVERTOWN.
Telegrams—"HYDROCHLORIC, FEN, LONDON."
Telephone—ROYAL 1166. (3 lines).

INVENTIONS PATENTED. TRADE MARKS REGISTERED.
Advice, Handbook and Consultations Free—KINGS PATENT AGENCY, Ltd. (Director, B. T. King, A.I.M.E., British and U.S. Regd. Patent Agent), 146a, QUEEN VICTORIA STREET, LONDON. 36 years' references.

SPENCER'S Patent Inclined HURDLE GRIDS.

THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, Oct. 10, p. 150.

GEORGE WILSON GAS METERS, Ltd.
for
GAS-METERS, ORDINARIES, SLOTS, AND REPAIRS,
Foleshill Road, COVENTRY.
Telephone: 596. Telegrams: "GASMETER,"
and at 268, Stockport Road, MANCHESTER.
Telephone: RUSHOLME 976. Telegrams: "GASMETER,"
and 46 & 47, Auckland Street, LONDON, S.E. 11.
Telephone: HOP 647. Telegrams: "GASEOUS LAMB."

CORRESPONDENCE TUITION in GAS ENGINEERING for City and Guilds Institute Exams. (Preliminary and Final). Successful Results. Low Fees.
PENNINGTONS ENGINEERING TUTORS, 254, Oxford Road, MANCHESTER.

J. E. C. LORD (Manchester), Ltd.,
Ship Canal Tar Works, Weaste, Manchester.
Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

PLANT, &c., FOR SALE & WANTED

GAS PLANT IN STOCK.

GASHOLDERS.—Various Capacities in Stock up to 125,000 c.ft. Low Prices for erection complete, with STEEL TANKS if preferred.
Condensers.—Annulars: Sets of 3 and 4, 12 in. Connections. Water Tube Condensers (½ million), 14 in. Conns., 6 in. and 8 in. Pipe Condenser.
Tower Scrubbers.—5 by 40, 5 by 30, 5 by 20, 4½ by 36, 4 by 24, 4½ by 18, Cast and Wrought Iron.
Purifiers.—Sets 30 by 25, 25 sq., 20 ft. sq., 12 ft. sq.
Exhausters.—Steam and Belt driven, 2000 to 50,000 c.ft. capacity.
Station Meters.—3000, 5000, 10,000, 15,000, up to 60,000 c.ft. capacity. New Drums.
Also a good stock of WASHERS, TAR EXTRACTORS, TANKS, PUMPS, ENGINES, VALVES, &c. Detailed List on application. Really First-Class Gas Plant, equal to new. Bargain prices for erection complete.
Firth Blakeley, Sons, & Co., Ltd.,
CHURCH-FENTON, *via* LEEDS.

RAILWAY Tank Wagons for Disposal, Rectangular and Cylindrical, specially suitable for Oil and Acids. Inquiries invited.
BROTHERTON & Co., LTD., LEEDS.

TWO 12 ft. Square Purifiers Dry Lutes, Cheap for prompt Sale.
Address No. 7354, "GAS JOURNAL," 11, BOLT COURT, FLEET STREET, E.C. 4.

FOR SALE—
One GASHOLDER and STEEL TANK, 15,000 cubic feet capacity.
Apply, BATES & SONS, WIGSTON LANE, AYLESTONE, LEICESTER.

STEAM-BOILERS For Sale—All Sizes, Vertical, Loco-type, Cornish, Portable, and Other Types of Boilers.
Apply GRANTHAM BOILER & CRANE CO., LTD. GRANTHAM.

FOR Immediate Sale — New Two-LIFT SPIRAL-GUIDED GASHOLDER, with STEEL TANK. Capacity, 123,000 c.ft.
Full Details and Price on Application to CLAYTON, SON, & Co., LTD., MOOR END WORKS, HUNSLET, LEEDS.

GALVANIZED and Black Corrugated FLAT and CURVED SHEETS. Also all Accessories. WIRE NETTING, TANKS, &c. State requirements, and we will quote Carriage paid Prices.
SOUTH WALES GALVANIZING COMPANY, GLANAMMAN, S. WALES.

CONTRACTS OPEN.

COUNTY BOROUGH OF STOKE-ON-TRENT.
(GAS DEPARTMENT.)

GAS CONSOLIDATION ACT (1922).

CONTRACT NO. 18.

THE Corporation invite Tenders for the Supply and Erecting of either:
Alternative "A"—A complete Carburetted Water-Gas Plant (800,000 c.ft.) in one unit, with Auxiliary Plant, &c.,
or Alternative "B"—A complete Total Gasification Plant, in duplicate units, each of 500,000 c.ft., with Auxiliary Plant, &c.

Plans, Conditions, Specifications, and Forms of Tender will be supplied on Application to the Chief Gas Engineer, Gas-Works, Etruria, Stoke-on-Trent, not later than Friday, the 4th of January, 1924.

All applications must be accompanied by a Deposit of £2 Treasury Notes in respect of each Specification for which Application is made, which Deposits will be returned on receipt of a *bona fide* Tender, and the return of all Plans and Documents.

Sealed Tenders, on the Form provided, to be delivered by post to the undersigned not later than Twelve noon on Thursday, Jan. 10, 1924, and endorsed Tender for Gas Plant, Contract No. 18 "A" and "B."

E. B. SHARPLEY,
Town Clerk.

Town Hall,
Stoke-on-Trent,
Dec. 22, 1923.

NANTWICH URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)
NEW CARBONIZING PLANT.

TENDERS are invited for the Installation of a New RETORT HOUSE containing Four Beds of Six HORIZONTAL RETORTS 24 in. by 16 in. Ω by 16 ft. long, complete with Guest-Gibbons CHARGING and DISCHARGING MACHINE, COAL HANDLING PLANT, and COKE GANTRY.

Specifications and full Particulars may be obtained from the Engineer and Manager (H. Vernon), Gas-Works, Nantwich, Cheshire, on receipt of a Deposit of £5, which will be returned on the receipt of a *bona fide* Tender.

Sealed Tenders, endorsed "New Carbonizing Plant," to be delivered to the undersigned not later than Jan. 14, 1924.

The lowest or any Tender not necessarily accepted.

A. E. WHITTINGHAM,
Clerk to the Council.

Clerk's Office:
14, Barker Street,
Nantwich, Cheshire,
Dec. 19, 1923.

COMPANY NOTICE.

CEARA GAS COMPANY, LIMITED.

NOTICE is Hereby Given, that the ORDINARY ANNUAL GENERAL MEETING of the Shareholders will be held at the Office of the Company, No. 9, Queen Street Place, in the City of London, on Thursday, the 27th day of December, 1923, at One o'clock in the afternoon, to receive the Report of the Directors; to elect a Director and an Auditor; and for General Purposes.

By order of the Board,
E. PRATT,
Secretary.

Dec. 20, 1923.

GASHOLDER AND TANK CONSTRUCTION AT THE SUTTON GAS-WORKS.

1,000,000 cubic feet capacity.

By F. SOUTHWELL CRIPPS.

Price 10/6 net.

WALTER KING, LTD., "GAS JOURNAL" OFFICES,
No. 11, Bolt Court, FLEET STREET, E.C. 4.

CARBURINE & BENZOL FOR GAS ENRICHING

ALSO
THE MAXIM PATENT CARBURETTOR.

For Prices, &c., apply to
The GAS LIGHTING IMPROVEMENT CO., Ltd.
ALEXANDRA HOUSE, QUEEN SQUARE,
LONDON, W.C. 1.
Telephones: Museum 7400, 7401, 7402, 7403, 7404.
Telegraphic Address: "Carburine, London."

STREET LAMPS | F. GOOCH, | CONVERSION SETS
GAS FITTINGS
FLASHING and other SIGNS | Beauchamp St., LONDON, E.C. | ARC LAMPS Indoor and Outdoor

BRITISH GAS PURIFYING MATERIAL.
ENGLISH BOG ORE AND NATURAL HYDRATED OXIDE OF IRON.
Spent Oxide Bought.
BRITISH GAS PURIFYING MATERIALS CO., LTD.
Arcadian Gardens, Wood Green, London, N.22.
Telegrams: "Bripurimat, Wood, London."
'Phone: Palmers Green 608.

KOPPERS CHAMBER OVENS.
KOPPERS VERTICAL OVENS.
KOPPERS REVERSIBLE REGENERATIVE RETORT SETTINGS.
See large Advert. appearing in alternate issues of the "Journal."
Inquiries for Chamber Ovens:
KOPPERS COKE OVEN CO., LTD.,
301, Glossop Road, Sheffield.
Telephones: 1331, 1332 *and* 1335.
Inquiries for Vertical Ovens and Retort Settings:
KING, TAUDEVIN & GREGSON, LTD.,
Melbourne Chmbrs, Cambridge St., Sheffield.
Telephone: 1753.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER,
Gas Engineers' Agents and Contractors for
METERS, FIRE-CLAY GOODS, OXIDE OF IRON AND ALL OTHER GAS APPARATUS.
Inquiries Solicited.
Telegrams—"DARWINIAN, MANCHESTER."
Telephone—2268 & 2269 City (Two lines).

GEO. ROBSON & CO.,
HODGSON ST.,
SHEFFIELD.

SCREENS
BUCKETS
SPROCKETS
CHAINS
ELEVATORS—CONVEYORS

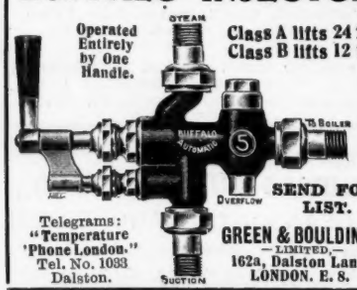
COKE FOR STEAM-RAISING PURPOSES;
And some other means of increasing its Sale
By
GEOFFREY M. GILL,
(Consulting Engineer)
Member of the Institution of Mechanical Engineers, Member of the Institution of Gas Engineers, Late Chief Engineer of the South Metropolitan Gas Company, London.
A Series of Articles Reprinted from the "Gas Journal" and Revised by the Author.
Price 1/6 Post Free.
Prices for Quantities on Application.

Published by WALTER KING, LTD., "GAS JOURNAL" OFFICES, 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4.

ROBERT DEMPSTER & SONS, Ltd., ELLAND, Builders of CARBONIZING PLANTS, both Horizontal and Vertical. Manufacturers of CONDENSERS, PURIFIERS, GASHOLDERS, &c., also every description of COAL and COKE HANDLING PLANT. Telegrams: "DEMPSTER, ELLAND." Telephone: ELLAND 261 (Private Branch Exchange).

EXTENSIONS and Renewals. Ask us to quote before ordering GAS APPARATUS, COKE-OVEN PLANT, STRUCTURAL STEELWORK. Competitive prices, First Class Workmanship. Satisfaction Guaranteed.
FIRTH BLAKELEY, SONS, & Co., LTD., CHURCH FENTON, YORKSHIRE.

TROTTER, HAINES, & CORBETT LIMITED
BRETTELL'S ESTATE,
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.
Manufacturers of GAS RETORTS, GLASSHOUSE FURNACE & BLAST FURNACE BRICKS, LUMPS, TILES, and every Description of FIRE BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.
LONDON OFFICE: E. C. BROWN & Co., LEADENHALL CHAMBERS, 4, ST. MARY AXE, E.C.

'BUFFALO' INJECTOR


Operated Entirely by One Handle.
Class A lifts 24 ft
Class B lifts 12 ft.
SEND FOR LIST.
Telegrams: "Temperature 'Phone London." Tel. No. 1033 Dalston.
GREEN & BOULDING, —LIMITED,— 162a, Dalston Lane, LONDON. E. 8.

JOHN HALL & CO. OF STOURBRIDGE LIMITED,
STOURBRIDGE,
Manufacturers of
FIRE-BRICKS, LUMPS, TILES,
GAS RETORTS,
And every description of Fire-Clay Goods
RETORTS CAREFULLY PACKED FOR SHIPMENT.

CAST IRON PIPES
FOR
GAS, WATER, & STEAM
1¼in to 12in. BORE.
THOS. ALLAN & SONS, LTD.,
Bonlea Foundry,
THORNABY-ON-TEES.
Telegrams: "BONLEA, THORNABY-ON-TEES."

WILLIAM PERCH, LTD.,
CARDIFF,
Colliery Proprietors, Coke Manufacturers,
GAS COAL SPECIALISTS.
Telegrams: "PERCH, CARDIFF." Telephones: Nat. No. 354, (Private Branch Exchange)

BOILERS
EX STOCK.

MOST MODERN "DISH-END" TYPE.
WITH CORRUGATED SECTIONS.

	W.P.	Shop No.
4 30 ft. by 9 ft. 3 ins. by	160 lbs.	5752/3 & 5928/9
1 30 ft. by 9 ft. 3 ins. by	125 lbs.	5974
1 30 ft. by 9 ft. 3 ins. by	120 lbs.	6027
2 30 ft. by 8 ft. 6 ins. by	160 lbs.	6127/8
1 30 ft. by 8 ft. 6 ins. by	120 lbs.	6026
1 30 ft. by 8 ft. 3 ins. by	120 lbs.	6163
2 30 ft. by 8 ft. 3 ins. by	100 lbs.	5680/81
4 28 ft. by 7 ft. 6 ins. by	120 lbs.	5791 & 5782/4
4 28 ft. by 7 ft. 6 ins. by	160 lbs.	5798/9 & 5756/7

All the above Boilers are built from "Siemens Martin" Acid Steel.
Repairs to all types of Boilers by first-class men. 9406
JOHN THOMPSON
(WOLVERHAMPTON) LTD.,
(WOLVERHAMPTON) ENG.

CASES FOR BINDING
QUARTERLY VOLUMES OF THE "JOURNAL."
Price 3s. 6d. each, post free.
LONDON: WALTER KING, LIMITED, 11, Bolt Court, Fleet Street, E.C.4.

COMPRESSORS & EXHAUSTERS FOR GAS AND AIR.
See our Advertisement Next Week.
REAVELL & CO. LTD. IPSWICH.

ROTARY METERS
are built in units of hourly capacities from
1000 cu. ft. to 1,000,000 cu. ft.
for COAL GAS, COKE OVEN GAS, AIR, &c.
CHEAP IN PRICE, OCCUPY VERY LITTLE SPACE, EASILY CLEANED.
MEASURE THE TOTAL VOLUME OF GAS PASSING.
THE ROTARY METER CO. LTD.
TALBOT ROAD, STRETFORD, MANCHESTER.

THOMAS BUGDEN & Co.,
India-Rubber and Airproof Manufacturers and General Contractors.
LARGEST MANUFACTURERS OF GAS MAIN BAGS.
Telegrams—"AIRPROOF, ISLING, LONDON." Telephone—748 CENT.

Gas Bags for Repairing Mains.
PATENTEES OF THE **DENMAR BAG.**
Impervious to Main Liquor and Climatic Influences.

Round or Cylinder Shape.
Drain Rods and Appliances.
Bellows and Inflators for Inflating Gas Bags.
CONTRACTORS TO H.M. GOVERNMENT

Contractors' and Miners' Woollen Jackets, Trousers, Hats, &c.
Oilskin Clothing, Tarpaulins, &c., Tar Hose, Sewer Boots.
Hose, Tubing, and Sheet of Every Description.
Wading and Well Dresses.

Stokers' Mitts and Gloves.
244, Goswell Road, LONDON, E.C.

Send for Illustrated Pamphlet to
"Arkon" Full-Scale Gauges
(Patent No. 181886/1922)
THE best series of single tube gauges available anywhere. Practically indestructible because of their extremely robust design.
Ranges 6", 12", 24", 30", 36", 42", 48", W.G., etc.
Types Pressure, Vacuum, and Pressure with Vacuum.
Styles Single, Twin, and Four Reading Gauges.
Uses Everywhere for Gas Pressures, Boiler Draughts, Liquid Levels in Tanks, Blast Pressures, Air Filters and many other applications.
Walker, Crosweller & Co.
38 Dane's Inn House, Strand, London, W.C.2.

INDEX TO "JOURNAL" ADVERTISERS.

	PAGE
Ackroyd & Best, Ltd.	809
Aerograph Company	—
Alder & Mackay, Ltd.	812
Aldridge & Ranken, Ltd.	—
Allan, Thomas, & Sons, Ltd.	848
Amalgamated Dinas Silica Works, Ltd.	—
Anglo-American Oil Company, Ltd.	—
Anglo-Swedish Electric Welding Co., Ltd.	—
Ashmore, Benson, Pease, & Co., Ltd.	—
Automatic Light Controlling Co., Ltd.	—
Bagshawe, and Co., Ltd.	—
Bale & Church, Ltd.	846
Balfour, Henry, & Co., Ltd.	—
Barrowfield Ironworks, Ltd.	807
Bates, J., & Sons	847
Belliss & Morcom, Ltd.	—
Benn Bros., Ltd.	—
Berk, F. W., & Co., Ltd.	Wrapper I.
Blair, Campbell, & M'Lean, Ltd.	819
Blakeley (Firth) Sons, & Co., Ltd.	848
Bland Light Syndicate, Ltd.	—
Bourne, C.	—
Braddock, J. & J.	846
British Aluminium Co., Ltd.	—
British Creosote Company, Ltd.	—
British Furnaces, Ltd.	812
British Gas Purifying Materials Company, Ltd.	847
British Mannesmann Tube Co., Ltd.	—
British Thomson-Houston Co., Ltd.	—
British Uralite and Cellactite Works	—
Brotherton & Co., Ltd.	847
Brown, John, & Co., Ltd.	809
Brownhills Chemical Works Co.	—
Bugden, T., & Co.	848
Burt, Boulton, & Haywood, Ltd.	—
Cannon Iron Foundries, Ltd.	—
Carless, Capel, & Leonard	—
Carron Company	—
Chance Bros. & Co., Ltd.	—
Chapman (Spencer) & Messel, Ltd.	847
Chemical Engineering and Wilton's Patent Furnace Company, Ltd.	Centre VII.
Clark's Syphon Stove Co., Ltd.	850
Clapham Bros., Ltd.	—
Clayton, Son, & Co., Ltd.	857
Clayton, Thomas (Oldbury), Ltd.	—
Cloake, A. G.	—
Cockey, E., & Sons, Ltd.	—
Coin Change Company, Ltd.	813
Columbus Machinery, Ltd.	—
Consett Iron Co., Ltd.	—
Cort, Robt., & Co.	852
Cossey, E. J., & Co.	—
Cowan, W. & B.	Wrapper III.
Crossley Bros.	—
Curtis's and Harvey's	—
Cutler (Samuel) & Sons, Ltd.	Centre IX.
Davies, Wm. Everard, & Co., Ltd.	—
Davison & Partner, Ltd.	856
Dempster, R. & J., Ltd.	844
Dempster, R., and Sons, Ltd.	Centre II., 848, 854
Dixon, Joseph, Crucible Company	—
Donkin Company, Ltd. (The Bryan),	Wrapper II.
Dorman, W. H., & Co., Ltd.	—
Drakes Limited	853
Drew-Bear, Perks & Co., Ltd.	—
Duroglass, Ltd.	816
Duxbury, Thomas, & Co.	847
Economical Gas Apparatus Construction Company, Ltd.	Centre VI.
Edgar, Wm.	—
Elcho Chemical Engineering Co., Ltd.	—
Engineering Supplies, Ltd.	—
Evans, Joseph, & Son (Wolverhampton), Ltd.	856
Eveson Coal and Coke Co., Ltd.	—
Ewart & Son, Ltd.	—
Ewart, Phelps, & Co., Ltd.	—
Excelsior Shade Manufacturing Co.	—
F. C. Construction Co., Ltd.	—
Falk, Stadelmann, & Co., Ltd.	—
Flood, S. H., & Co., Ltd.	—
Foster & Pullen, Ltd.	—
Fraser & Chalmers Engineering Works	—
Gas Lighting Improvement Co., Ltd.	847
Gas Purification and Chemical Company, Ltd.	Wrapper I., 846
Gas Meter Company, Ltd.	Wrapper IV., 816
Gibbons Bros., Ltd.	855
Glenboig Union Fire Clay Company, Ltd.	851
Glover (George) and Co., Ltd.	Wrapper I.
Glover, Thos., & Co., Ltd.	822
Gooch, F.	847
Goodall, Clayton, & Co., Ltd.	Centre VI.
Grainger, J. E.	—
Grant, David, & Co.	850
Grantham Boiler and Crank Company, Ltd.	847
Green and Boulding, Ltd.	848
Griffin, John J., & Son, Ltd.	—
Griffiths Bros. & Co. (London), Ltd.	Wrapper I.
Hall, John, & Co., Stourbridge, Ltd.	848
Hardman and Holden, Ltd.	808
Harris and Pearson	854
Hawley, J., & Sons	—
Hawthorn Leslie & Co.	—
Head, Wrightson, & Co., Ltd.	Wrapper I.
Hislop, R. & G.	852
Holborn Lamp and Sign Works	—
Holland, F. H.	—
Holmes, F. G., & Co., Ltd.	—
Holmes, W. C., & Co., Ltd.	808
Hooper and Weyman, Ltd.	—
Horseley Bridge and Engineering Company, Ltd.	Wrapper II.
Horstmann Gear Company, Ltd.	819
Humphreys and Glasgow, Ltd.	820
Hutchinson Bros., Ltd.	—
Jenkins, W. J., & Co., Ltd.	—
Jobson and Beckwith, Ltd.	—
Joymanco (Brighton), Ltd.	—
Keighley Gas and Oil Engine Company, Ltd.	—
Keith, James, and Blackman Company, Ltd.	858
Kent, Geo., Ltd.	821
Kenyon, Alexander, & Co., Ltd.	—
Kieselguhr Supplies Co.	—
King, Taudevin, & Gregson, Ltd.	847
King's Patent Agency	847
Kirkham, Hulett, and Chandler, Ltd.	—
Koppers' Coke Ovens Co., Ltd.	847
Laidlaw, R., & Son (Edin.), Ltd.	856
Laidlaw, R., & Son, Ltd.	—
Le Grand, Sutcliff, and Gell	—
Lead Wool Company, Ltd.	—
Lighting Trades, Ltd.	—
Lord, J. E. C. (Manchester), Ltd.	847
Low Temperature Construction, Ltd.	—
Main, R. & A., Ltd.	811
McKelvie, James, & Co.	Wrapper I.
McRea, Hugh, Ltd.	850
Meldrums Limited	—
Messenger & Sons	—
Metropolitan Gas Meters, Ltd.	—
Mewburn, Ellis, & Co.	846
Midland Railway Carriage and Wagon Co., Ltd.	Wrapper IV.
Mitchell, H.	—
Mitchell Conveyor and Transporter Co., Ltd.	—
Mobberley and Perry, Ltd.	—
Moore, Walter, & Sons	Wrapper I.
Morden, S. H., & Co., Ltd.	—
Neill & Son, Ltd.	Wrapper I.
New Conveyor Co., Ltd.	—
Newton, Chambers, & Co., Ltd.	854
New Inverted Incandescent Gas Lamp Company, Ltd.	—
Orme, George, & Co.	—
Oughtibridge Silica Firebrick Company, Ltd.	813
Page, Chas., & Co., Ltd.	—
Parkinson and W. & B. Cowan, Ltd.	852
Parkinson Stove Company, Ltd.	Centre III.
Parkinson, W., & Co.	822
Peckett & Sons, Ltd.	815
Peebles & Co., Ltd.	—
Penney and Porter, Ltd.	846
Penningtons Engineering Tutors	847
Perch, William, Ltd.	848
Pifco, Ltd.	—
Piggott, Thos., & Co., Ltd.	806
Pinchbeck, Ltd.	—
Pleno, Ltd.	—
Pocock, Herbert	—
Podmore, A. E., & Co.	—
Potterton, Thos.	—
Procter, E. W.	808
Pulsometer Engineering Company, Ltd.	Wrapper IV.
Radiation, Ltd.	Centre IV., V.
Ramie Co.	—
Reavell & Co., Ltd.	848
Richmond Gas Stove & Meter Co., Ltd.	—
Ride and Bell, Ltd.	—
Riley, John, & Sons, Ltd.	—
Robson, Geo., & Co.	847
Rotary Meter Company, Ltd.	848
Safety Globe Co.	—
Sawer & Purves	Centre VIII.
Serck Tubes, Ltd.	812
Sheepbridge Coal & Iron Co., Ltd.	Wrapper IV.
Shell-Mex, Ltd.	—
Shields & Ramsay	—
Sigma Instrument Company	—
Simon-Carves, Ltd.	805
Simplex Concrete Piles, Ltd.	—
Smith, J. & W. B., Ltd.	—
Smith Meters, Ltd.	—
South Metropolitan Gas Company	850
Spencer-Bonecourt, Ltd.	—
Spencer Chapman, & Messel, Ltd.	847
Spencer, Walter, & Sons	847
Staffordshire Tube Co., Ltd.	—
Staniforth, H.	—
Stanton Ironworks Co., Ltd.	Centre X.
Staveley Coal & Iron Co., Ltd.	—
Stein, J. G., & Co., Ltd.	Wrapper I.
Stephenson, Andrew	846
Stewarts & Lloyds, Ltd.	Wrapper I.
Stothert & Pitt, Ltd.	—
Stoves, Ltd.	—
Strachan & Henshaw, Ltd.	—
Stringer Bros.	—
Sugg, Wm., & Co., Ltd.	—
Sutherland Meter Company, Ltd.	—
Swan and Garner	—
Taylor, Joseph, & Co. (Saturators), Ltd.	846
Telephos, Ltd.	851
Thermal Syndicate, Ltd.	851
Thompson, John (Wolverhampton), Ltd.	848
Thrutchley & Co., Ltd.	—
Tilley High Pressure Gas Syndicate, Ltd.	—
Torbay Paint Company	Wrapper I.
Trier Bros., Ltd.	—
Trotter, Haines, and Corbett, Ltd.	848
Tully Gas Plants, Ltd.	814, 846
Turbine Furnace Co., Ltd.	—
Turner, F.	—
Underfeed Stoker Co., Ltd.	Centre IX.
Vee-Reg Valves—Engineering Specialists, Ltd.	—
Vertical Gas Retort Synd., Ltd.	809
Vickers, Ltd.	815
Vislok, Ltd.	—
Volker Lighting Corporation	—
Walker Automatic Gas Signs	815
Walker, C. & W., Ltd.	Centre VI.
Walker, Crosweller, & Co.	848
Waller, Geo., & Son, Ltd.	806
Waugh, Walter, & Co.	852
Welsbach Light Company, Ltd.	817
West's Gas Improvement Co., Ltd.	810
Westwood and Wrights	—
Whessoe Foundry and Engineering Company, Ltd.	—
Wholesale Fittings Company, Ltd.	—
Wilkinson, G.	—
Williamson, Cliff, Ltd.	—
Willey & Co., Ltd.	—
Wilson, Carter, and Pearson	—
Wilson (George) Gas Meters, Ltd.	847
Wilsons & Mathiesons, Ltd.	—
Wood, Hugh, & Co.	—
Woodall-Duckham Co.	Centre I., 818
W.R. Patents, Ltd.	—
Wright, Alex., and Co., Ltd.	Centre VIII.
Wright, John, & Co.	—

Appointments Vacant and Wanted	—
Company Notices	847
Contracts Open	847
Plant Wanted and for Sale	847
Stocks and Shares	—

Cleans Cookers Easily

THE Institute of Hygiene has recognised the utility of "OVEN-O" by awarding it the certificate of the Institute.

Cleanliness is of the first importance in the preparation of food, and a clean cooker is thoroughly hygienic. Clean and bright oven walls reflect the heat better than those that are dull and dirty, and cooking utensils which are free from carbon deposit conduct the heat more efficiently. "OVEN-O" is

HARMLESS TO THE HANDS.

Simple, safe and effective. Its regular application will result not only in a saving of gas but in hygienic cookery.

SOLD AT 6½d & 1/-

OVEN-O cleans gas-cookers easily

Recommended by the Richmond Gas Stove and Meter Company, Ltd.

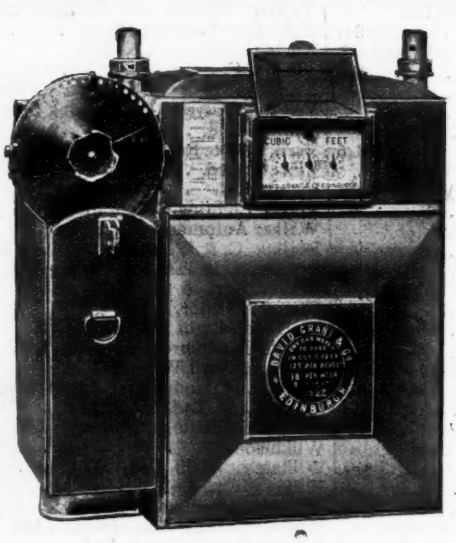
Sole Makers: HUGH McREA, Ltd., Great Northern House, 345 Gray's Inn Road, W.C.1

Send for full particulars to the Sole Selling Agents for Gas Undertakings in Great Britain and Colonies,

CLARK'S SYPHON STOVE CO., LTD., 164-172 Queen Victoria St., London, E.C. 4, and Grappenhall Works, Warrington.

ESTABLISHED 1855.

DAVID GRANT & CO.



WET and DRY GAS METERS,
STANDARD DRY METERS,
STATION METERS, PRESSURE GAUGES, SYPHON PUMPS.

SLOT METERS Simple, Strong, Compact, Accurate.

EAST CROSSCAUSEWAY, EDINBURGH.
Telegrams: "Dagran Edinburgh." Telegrams: Museum 574

TRADE *Metro* MARK

CHEMICAL PRODUCTS

Benzole, Toluole, Solvent Naphtha, Creosote Oils, Grease Oils, Carbolic Acid, Dark Cresylic Acid, Naphthalene, Pyridine, Anthracene, Refined Tar, Pitch.

Dry Neutral Sulphate of Ammonia, Sulphite of Ammonia, Muriate of Ammonia, Ammonium Chloride, Ammonium Polysulphide, Concentrated Ammonia Liquor, Liquor Ammonia.

Oxide of Iron for the purification of Gas, Sodium Sulphide, Ferric Sulphate, Copperas, Glauber's Salt, Sodium Hyposulphite, Nitre Cake, Salt Cake.

Sulphuric Acid of all strengths.

Intermediates for Dyes.

Manufacturers:

SOUTH METROPOLITAN GAS CO.,
Products Department,
709, OLD KENT ROAD, LONDON, S.E. 15.

Telephone: New Cross 2060. Tel. Address: "Metrogas, Peck, London."

These large VITREOSIL advertisements will appear in the DAILY MAIL.

Another Broken Gas Globe! Another Shattering Memory!
HEAT PROOF
VITREOSIL Gas Globes
Today you are buying Gas Globes!
Do You Use Gas Light?
At last! The Gas Globe You've longed for
VITREOSIL HEAT PROOF Gas Globes
A Vitreosil Globe will last Litre's Lifetime

VITREOSIL HEAT PROOF Gas Globes

MILLIONS

OF POSSIBLE CUSTOMERS WILL READ THEM DURING DECEMBER AND JANUARY

If you carry Vitreosil Globes, look them over to see that you have a complete range with which to meet all enquiries. If you have not yet commenced to stock Vitreosils, we shall be pleased to fill your order for a representative selection, so that you may secure a share of the sales which our intensive advertising campaign is bound to create.

Send for Illustrated List & Trade Terms.

The THERMAL SYNDICATE, Ld.
Sales Dept. D,
Vitreosil Works, Wallsend-on-Tyne
London Depot: 28, Victoria St., S.W. 1.

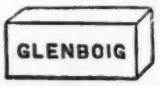
WATCH the DAILY MAIL!

THE GLENBOIG UNION FIRE-CLAY CO., LTD.

Manufacturers of the highest grade of Refractory Fire Bricks, specially suited for furnaces subjected to the highest heats and sudden changes of temperature.

All Glenboig Goods are stamped with either "Glenboig" or "Star Works, Glenboig" Brands as under—

REGISTERED

TRADE 

MARKS.

The Two Glenboig Brands are identical in quality and are used indiscriminately in the execution of orders.

GAS RETORTS

HORIZONTAL, INCLINED, & VERTICAL RETORTS to New Standard Specification. Special Bricks and Blocks for all modern Gas Settings.

Telegraphic Address:
"GLENBOIG, GLASGOW."

Glasgow Telephones
No. 2120 Douglas, No. 3009 Douglas.

Coatbridge Telephone
No. 25.

58 FIRST AWARDS

At International and Home Exhibitions,
including
Grand Prize at Brussels, 1910.
In every case the Highest Award given for Fire Clay Goods.

Contractors to His Majesty's Home and Indian Governments, and the principal National Arsenals of Europe.
On the Admiralty and War Office Lists.

Works: GLENBOIG, GARTCOSH, and CUMBERNAULD.
Head Offices: 48, WEST REGENT STREET, GLASGOW.

Walter Waugh & Co.

4, LLOYDS AVENUE,
LONDON, E.C. 3.

Telegraphic Address:
"Swaltaugh, Fen., London."

Telephone:
5660 Avenue (3 lines).

TAR, AMMONIA, AND CYANOGEN PRODUCTS.

PITCH A SPECIALITY.

RETORT SETTINGS

WILSON'S (CONT-INT.) VERTICALS

HISLOP'S HORIZONTALS

RENEWALS & NEW BENCHES

GAS-WORKS ERECTED COMPLETE.

R. & G. HISLOP
Underwood House,
PAISLEY

THE "PARKINSON"

TYPE "G" SERIES

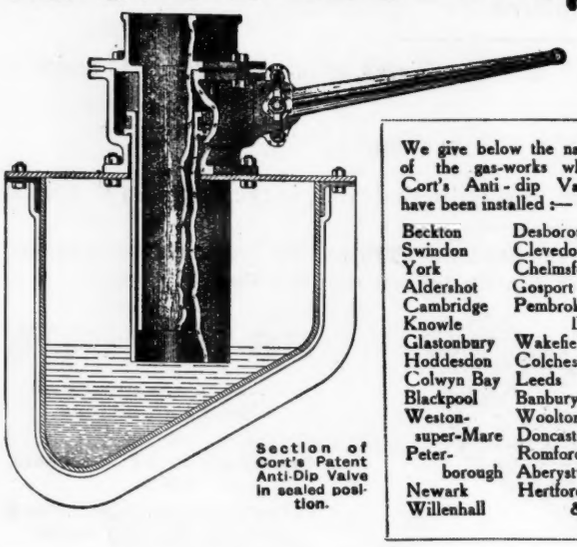
No. 840
Cast Brass PRE-HEATED INVERTED BURNER.

Model "B."
Single Outside GAS and AIR Regulator.

Write for List 80.

PARKINSON and W. & B. COWAN, LTD.
Lighting Specialists,
LONDON. BIRMINGHAM. BELFAST.
EDINBURGH. MANCHESTER. SYDNEY, N.S.W., &c., &c.

Over 100 Gasworks Have Installed CORT'S patent ANTI-DIP VALVE



Section of Cort's Patent Anti-Dip Valve in sealed position.

We give below the names of the gas-works where Cort's Anti-dip Valves have been installed :—

Beckton	Desborough
Swindon	Clevedon
York	Chelmsford
Aldershot	Gosport
Cambridge	Pembroke Dock
Knowle	Wakefield
Glastonbury	Colchester
Hoddesdon	Leeds
Colwyn Bay	Banbury
Blackpool	Woolton
Weston-super-Mare	Doncaster
Peterborough	Romford
Newark	Aberystwyth
Willenhall	Hertford &c.

THE search for increasing efficiency in carbonising plant has led to many inventions. One that has been proved outstanding in efficiency is Cort's Anti-dip Valve, because it removes all the causes for objection expressed in regard to other tried plant or apparatus.

The fact that it is used in over 100 gas-works, including some of the largest concerns in the country, speaks for itself.

Cort's Anti-dip Valve satisfies every requirement for the particular purpose for which it is intended.

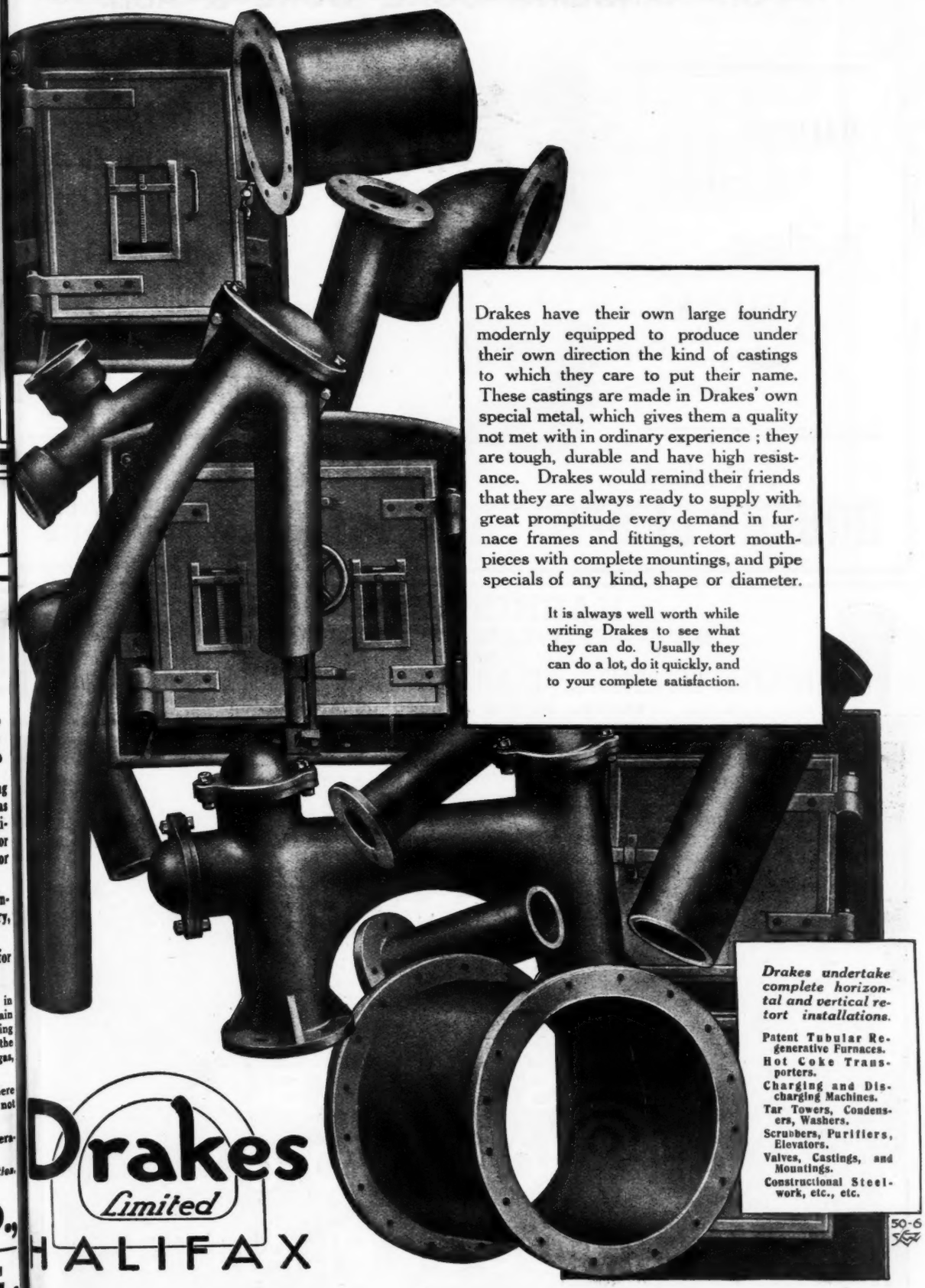
1. A substantial increase in therms and "make per ton" are assured.
2. Each retort is independently under control.
3. Trouble with stopped pipes eliminated.
4. No pressure on the retorts exists as the apparatus permits working under level gauge conditions.
5. It is extremely simple in construction, and certain in action, all working parts being out of the path of the foul gas, &c.
6. The Ideal Dip Pipe where hydraulic mains are not level.
7. Mistake proof in operation.

We shall be pleased to forward full particulars on application.

ROBT. CORT & SON, LTD.,

Engineers and Ironfounders, READING.

Hundreds of Patterns



Drakes have their own large foundry modernly equipped to produce under their own direction the kind of castings to which they care to put their name. These castings are made in Drakes' own special metal, which gives them a quality not met with in ordinary experience ; they are tough, durable and have high resistance. Drakes would remind their friends that they are always ready to supply with great promptitude every demand in furnace frames and fittings, retort mouthpieces with complete mountings, and pipe specials of any kind, shape or diameter.

It is always well worth while writing Drakes to see what they can do. Usually they can do a lot, do it quickly, and to your complete satisfaction.

Drakes undertake complete horizontal and vertical retort installations.

Patent Tubular Regenerative Furnaces.
Hot Coke Transporters.
Charging and Discharging Machines.
Tar Towers, Condensers, Washers.
Scrubbers, Purifiers, Elevators.
Valves, Castings, and Mountings.
Constructional Steelwork, etc., etc.

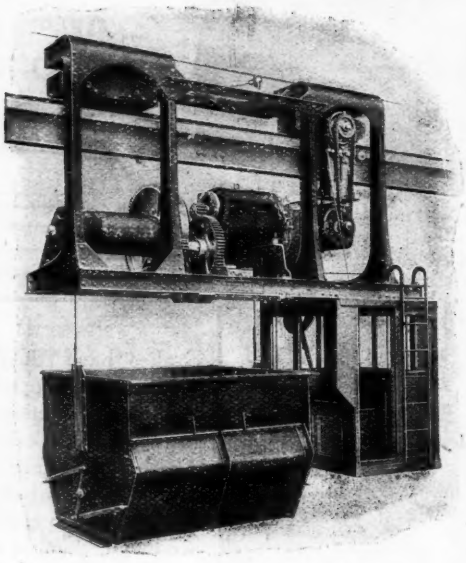
Drakes
Limited
HALIFAX

50-6

HIGH EFFICIENCY TELPHERS.

FOR HANDLING COAL, COKE & ASH.

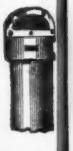
SALIENT FEATURES OF THESE TELPHERS



COMPACTNESS
STRENGTH
ACCESSIBILITY
RELIABILITY
DURABILITY
PATENT SILENT TRAVELLING WHEELS

ROBERT DEMPSTER & SONS, LTD., ELLAND YORKS.

HARRIS & PEARSON,
STOURBRIDGE, ENGLAND.
MANUFACTURERS OF
FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.
GLAZED BRICKS AND PORCELAIN BATHS.



— ESTABLISHED 1793 —

NEWTON, CHAMBERS & Co LTD.
THORNCLIFFE,
NEAR SHEFFIELD
— FOR —
GAS WORKS,
CHEMICAL WORKS,
— AND —
BY-PRODUCT PLANTS.

The GUEST-GIBBONS PATENT *RETORT CHARGING & DISCHARGING* MACHINE

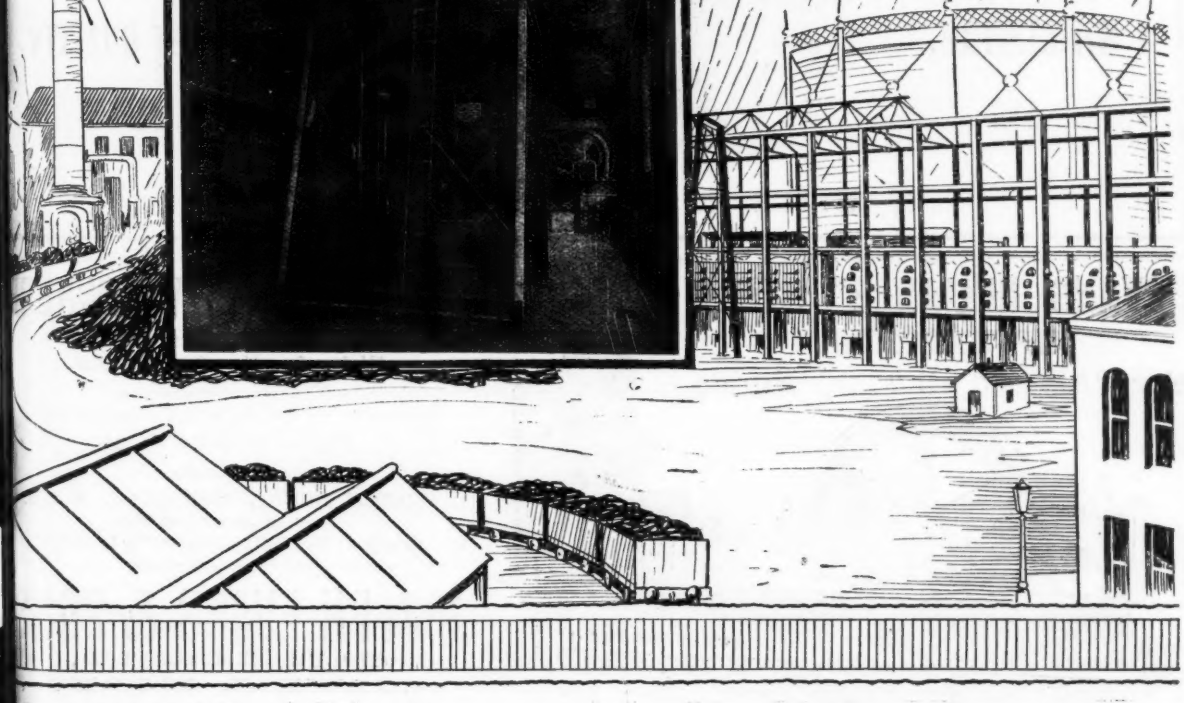
for HORIZONTAL RETORTS

Bigger Charges Better Carbonised

EFFICIENT
Two 12-hour charges in 24 hours.
Charge left porous for thorough carbonization. Weight of charges simply adjusted to suit requirements.

ECONOMICAL
Two 8-hour shifts in 24 hours with the least possible number of men and no waste of coal.

RELIABLE
Users say:—
"It never misses a turn."
Long life with little attention. Every detail designed for lasting service.



GIBBONS BROS. LTD.,

Telephone 2450 Dudley. DUDLEY, WORC. Telegrams. "Gibbons, Lower Gornal."

LONDON OFFICE: 151-154, Palace Chambers, Westminster, S.W. 1.

MANCHESTER: 85, Trevelyan Buildings. 52, Corporation Street.

BRISTOL: 20, Cotham Park.

NORTH EASTERN: Staffa House, Middleton St. George, Co. Durham.

MELBOURNE: 340, Spencer Street.

WATER GAS

BLUE AND CARBURETTED WITH WASTE HEAT BOILERS.

OVER 24 YEARS' EXPERIENCE.

DAVISON & PARTNER, LTD.

11, CARTERET ST., WESTMINSTER, S.W.1.

TELEGRAMS: "SAGRETAW, PARL., LONDON." TELEPHONE: VICTORIA 7856

R. LAIDLAW & SON (EDIN.) LTD.

SIMON SQUARE WORKS, EDINBURGH.

NEW PATTERN SLOT METER FOR PENNIES OR SHILLINGS.

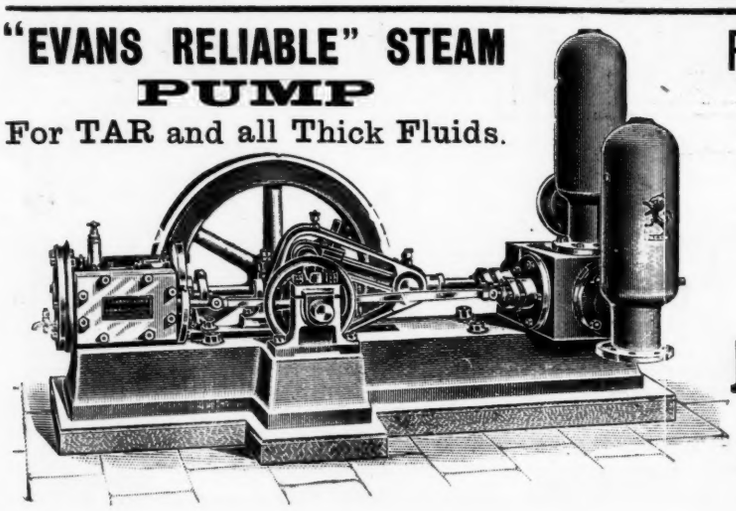
ACCURACY STRENGTH SIMPLICITY

MATERIAL AND WORKMANSHIP HIGHEST QUALITY.

6, LITTLE BUSH LANE, LONDON, E.C.

"EVANS RELIABLE" STEAM PUMP

For TAR and all Thick Fluids.



FIRST AWARDS EVERYWHERE

Write for No. 8 Catalogue.

Telegrams: "EVANS, WOLVERHAMPTON."
National Telephone No. 39.

London Office:
CRAVEN HOUSE, KINGSWAY, W.C.2.
Telephone: GERRARD 7044.
Telegrams: "DRYOSBO, WESTCENT, LONDON."

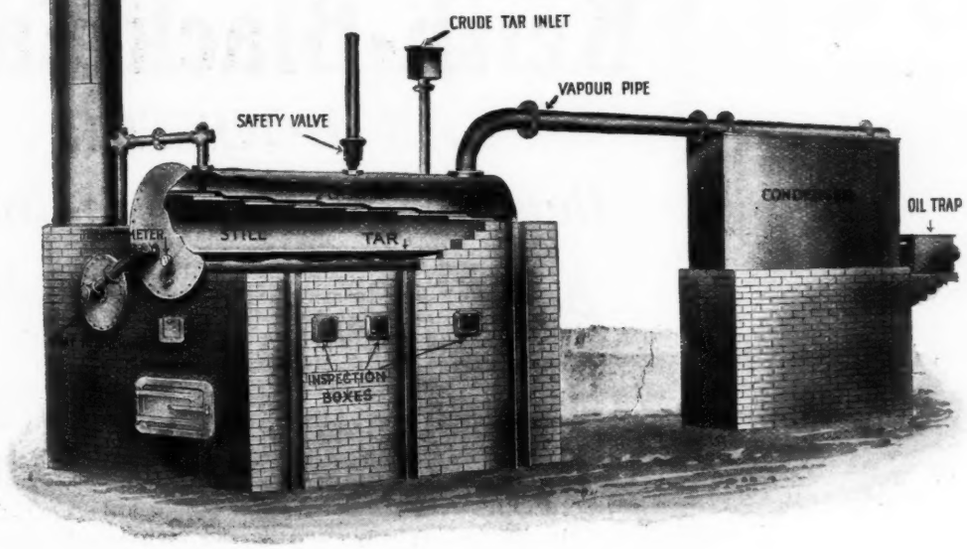
JOSEPH EVANS & SONS

(WOLVERHAMPTON) LTD.,
CULWELL WORKS,
WOLVERHAMPTON.

ARE YOU MAKING THE BEST USE OF YOUR TAR. ?

THE "CASCADE" SYSTEM

PATENT CONTINUOUS
TAR DEHYDRATION PLANT

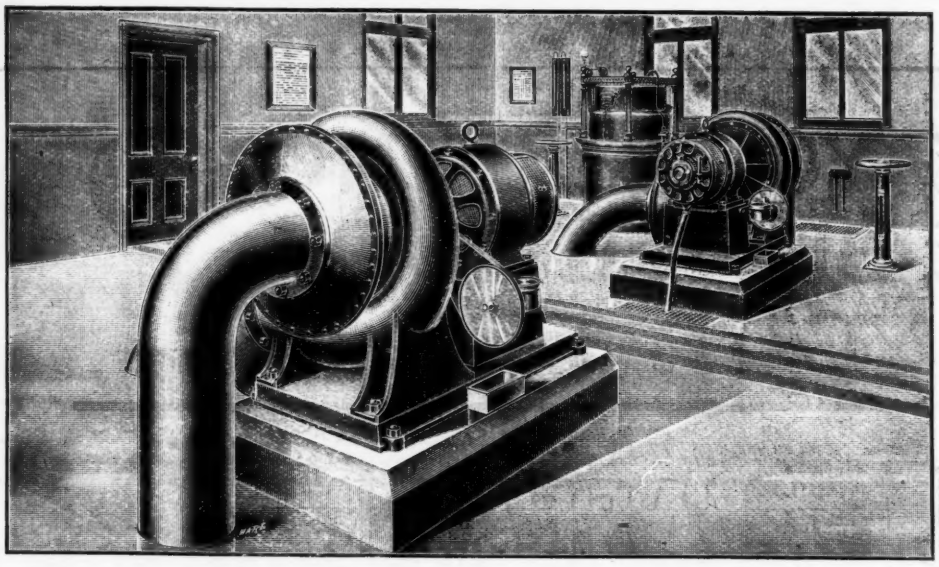


UNRIVALLED FOR
ECONOMY, SIMPLICITY & EFFICIENCY.

OWNERS OF PATENT RIGHTS & SOLE MANUFACTURERS

CLAYTON SON & Co. LTD.

Hunslet, LEEDS.



Duplicate Keith-Blackman Gas Boosting Plant and Automatic Bye-pass Governor installed in a large Gas Works.

It is cheaper, quicker and more effective to instal a

Keith-Blackman

GAS BOOSTER

than to lay larger mains.

A "KEITH - BLACKMAN" Gas Booster is the ideal machine for increasing the pressure of gas so as to force a greater volume through existing mains for augmenting the supply of gas to outlying districts, or to distant storage holders, etc., etc.

It is gas-tight and gives a constant pressure while passing a varying volume of gas. Its power consumption is very low.

It takes up small floor space, and requires only a light foundation, as its rotating parts are so carefully balanced that there is little or no vibration.

Its extreme simplicity renders breakdown most unlikely, and lubricating the bearings about once a week is all the attention it requires.

It is made in various sizes for dealing with 10,000 c.ft. per hour up to 1,000,000 c.ft. The added pressures can be anything within reason from a rise of, say, 3" W.G. (or less, if preferred) up to 40" W.G. It is practical to give even higher pressures should necessity arise.

We shall be pleased to give you the benefit of our wide experience, either by means of a personal visit from one of our Engineers, or in the form of a scheme and estimate on receiving full particulars of your requirements.

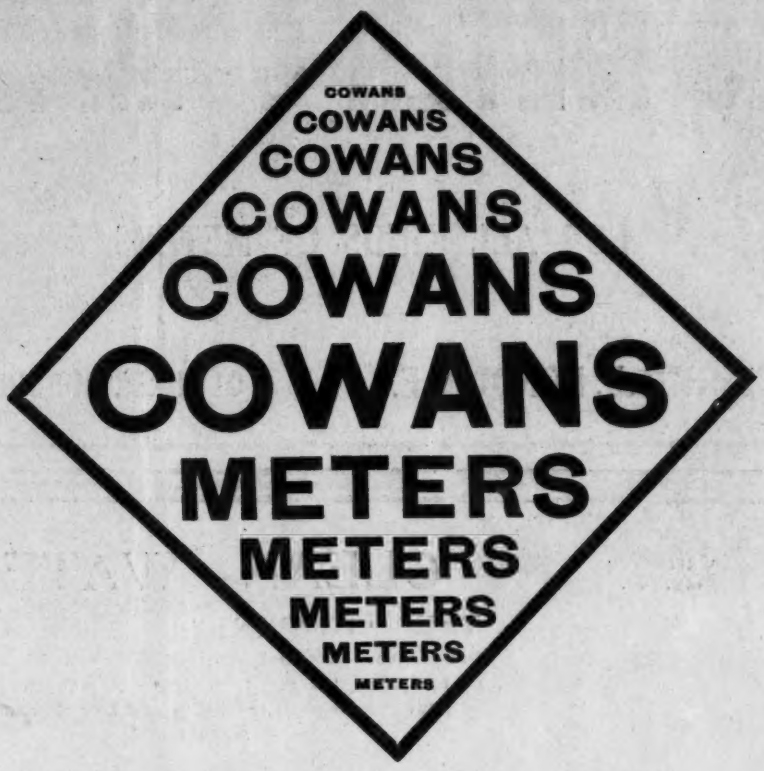
Interesting Booklet on "Gas Boosting" sent on request.

James Keith & Blackman Co., Ltd.,

27, Farringdon Avenue, LONDON, E.C. 4.

Branches at MANCHESTER, BIRMINGHAM, LEEDS, GLASGOW, EDINBURGH, NEWCASTLE, BELFAST, CARDIFF, Etc.

Printed (at the Chancery Lane Printing Works, Ltd.), for WALTER KING, LIMITED, No. 11, BOLT COURT, FLEET STREET, LONDON, E.C.4.—Wednesday, December 26, 1923.



DRY — IN TIN OR CAST IRON CASE RATED IN LIGHTS OR ACCORDING TO NEW STANDARD.

WET DUPLEX — "A" AND "B" SIZES.

PREPAYMENT — DRY AND WET.

TEST METERS. LAMP METERS. STATION METERS.

W. & B. COWAN

INCORPORATED IN

Parkinson and W. & B. Cowan, Ltd.

FITZALAN STREET WORKS, KENNINGTON ROAD, LONDON, S.E. 11.

Victory Works, Stretford, **MANCHESTER**; Buccleuch Street Works, **EDINBURGH**; The Glasgow Meter Works, 57, John Street, Bridgeton, **GLASGOW**; Mornington Street, Ormeau Road, **BELFAST**; Commonwealth Meter Works, Wells Street, Redfern, **SYDNEY, N.S.W.**; 56, a'Beckett Street, **MELBOURNE**; Duncan Street, Fortitude Valley, **BRISBANE**; Ballance Street Works, **WELLINGTON, N.Z.**

The GAS METER COMPANY, LTD.

FOR ALL KINDS OF METERS

238, Kingsland Rd., LONDON, E.2. And at OLDHAM, DUBLIN & MANCHESTER

WRITE FOR LIST 46.

RESULTS GUARANTEED.

CLEAN WATER!

THE "TORRENT" FILTER will render Dirty River or Canal Water bright and clear at a cost of less than ¼d. per 1000 gallons. It can be cleaned without removing the filtering material and with the least amount of labour.

Pulsometer Engineering Co. Ltd.

LONDON: Offices, 11, Tothill Street, WESTMINSTER, S.W.

READING: Works, NINE ELMS IRON WORKS.

Cast Iron Pipes and Castings

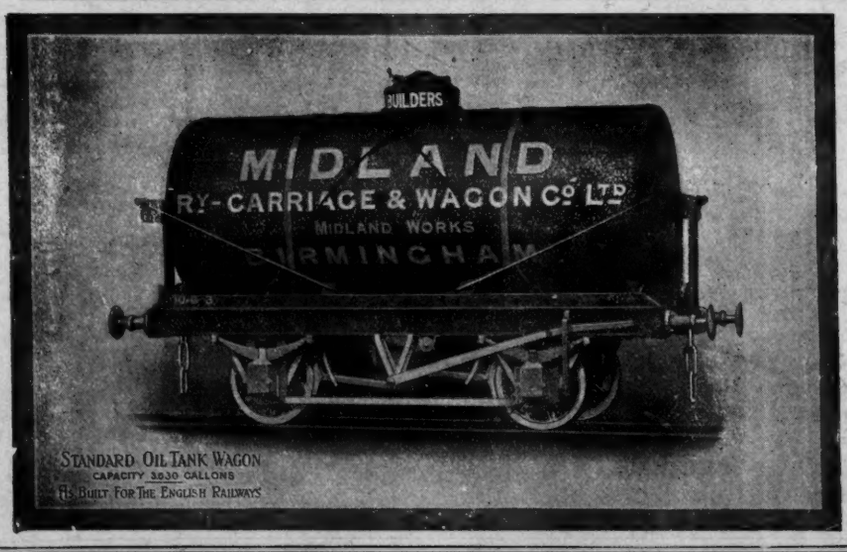
for all Gas and water purposes.

Lamp Columns, Surface Boxes, Manhole Frames and Covers, Tanks, Columns, and Retort Castings.

Cast Iron Pipes for gas and water mains, steam ranges, and hydraulic pressure.

Sheepbridge Coal & Iron Co. Ld.

Telephone: 356 (7 lines). CHESTERFIELD **Telegrams: "Sheepbridge," Chesterfield.**



MAKERS OF

RAILWAY TANK WAGONS

and

Railway Rolling Stock

Of every Description.

For SPECIFICATION and PRICES apply to the

Midland Railway Carriage and Wagon Co., Ltd.,

Midland Works, BIRMINGHAM.

Telegraphic Address: "Wagon Birmingham."

Telephone Nos.: 483, 484, 485, 944 & 945 East (5 lines).

London Office: 3, Central Buildings, Westminster, S.W. 1.

Telephone: 7140 Victoria. Telegrams: "Underframe, Vic. Ldn."

Printed (at the Chancery Lane Printing Works, Ltd.), for Walter King, Limited, No. 11, Bolt Court, Fleet Street London, E.C. 4.—Wednesday, December 26, 19